THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

VOL. XIX. No. 450—22ND YEAR.] LONDON, JANUARY 18, 1870. [Subscription per Annum. { 15s. in Advance. 18s. Credit.] DOUBLE NO. Price 1s.

RAMSAY'S NEWCASTLE CANNEL COAL. Analysis—
10,000 cubic feet of gas per ton of coal.
26-candle gas.
13¼ cwt. coke per ton of coal.
RAMSAY'S PATENT CONDENSED COKE.
DO. GARESFIELD COKE.

RAMSAY'S FIRE-CLAY ARTICLES.
GAS-RETORTS, introduced 1828.
FIRE-BRICK WORKS, established 1804.
FIRE-CLAY SANITARY PIPES, CHIMNEY-TOPS, and all Goods made of Fire-Clay.
The Fire-Clay is worked from Blaydon Main Colliery, is of excellent quality, and no expense spared in perfecting every article.
The FIRE-BRICKS (marked "RAMSAY") are to be seen in all parts of the world, and the Works are the most extensive in the Kingdom.
Manufactories—Derwenthaugh, Swalwell, and Hebburn Quay, near Newcastle-on-Tyne; and London Wharves—Falcon Wharf, No. 80, Bankside; and Honduras Wharf, Cubit Town. Large stocks kept.
Address G. H. RAMSAY, NEWCASTLE-ON-TYNE.

GEORGE GLOVER & CO.,
Patentees of the Standard Gasometers for the Government, and of the
IMPROVED DRY GAS-METERS.
These Meters are warranted to measure correctly and not to vary, and have come into general use more rapidly than any Meters hitherto manufactured.

PARIS EXHIBITION, 1867.
THE TESTING-HOUSE REPORTS.
The Reports prepared for the Science and Art Department, under the direction of the Lords of the Council, detail the arrangements made for testing the gas apparatus exhibited. In the testing-house erected by the Special Committee appointed to further this object a gasholder was constructed by Mr. G. Glover, being a *fac simile* of that produced and patented by him in 1860, and deposited in the Exchequer, under the provisions of the Sales of Gas Act, and British manufacturers of gas apparatus were invited by advertisement, and by direct application, to forward worthy objects for exhibition. Mr. G. Glover was, however, the only manufacturer who sent Meters to be tested. The report states that, as "Mr. Glover is a manufacturer of Dry Meters only, no opportunity presented itself of comparing their accuracy with that of Wet Meters under various circumstances, but the perfection to which that maker has brought his Meters prevents the possibility of those extravagant errors which are well known to exist where Wet Meters are used."
Particulars and lists of prices forwarded on application to Ranelagh Works, Ranelagh Road, Pimlico, LONDON, S.W.; 15, Market Street, MANCHESTER; or 127, Boulevard de Magenta, PARIS.

COWEN'S PATENT FIRE-CLAY RETORTS.
JOSEPH COWEN and CO.,
BLAYDON BURN, NEAR NEWCASTLE-ON-TYNE,
Were the only parties to whom a PRIZE MEDAL was awarded at the GREAT EXHIBITION of 1851, for "GAS-RETORTS and OTHER OBJECTS in FIRE-CLAY," and they have also been awarded in the INTERNATIONAL EXHIBITION of 1862, the PRIZE MEDAL for "GAS-RETORTS, FIRE-BRICKS, &c., for EXCELLENCE of QUALITY."
J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts in the United Kingdom; and orders for Fire-Clay Retorts of all shapes and dimensions, Fire-Bricks, and every other article in Fire-Clay, are promptly executed at their Works as above.
COWEN'S GARESFIELD COALS.
Coal Office,
QUAY SIDE, NEWCASTLE-ON-TYNE.

FIRST PRIZE IN THE PARIS EXHIBITION.
JOHN RUSSELL and CO.,
THE OLD TUBE-WORKS,
CHURCH HILL, WEDNESBURY;
ALMA WORKS,
WALSALL, STAFFORDSHIRE;
and 69, UPPER THAMES STREET, LONDON,
Original Manufacturers of Wrought-Iron Gas-Tubes, and Holders of the present Patents; Inventors and First Makers of LAP-WELDED FLUES for Steam-Boilers.
J. R. and Co. make all kinds of Tubes and Fittings for Gas, Steam, and Water, and the largest orders may be executed in a few days.
Gun Metal, and all other kinds of Cocks, Stocks, Dies, and Taps, Galvanized Tubes, &c.
N.B.—All goods thoroughly tested before sent out, and warranted.

JOHN BENT & SON,
WET AND DRY GAS-METER
AND
STREET-LAMP
MANUFACTURERS,
BELL BARN ROAD, BIRMINGHAM.
ESTABLISHED 1830.
All materials found for the alteration of Public Lamps for lighting with the Rod. Regulators with Lava Burners.

BLAYDON BURN AND LOW BENWELL FIRE-CLAY RETORT AND FIRE-BRICK WORKS,
NEAR NEWCASTLE-ON-TYNE.
WILLIAM COCHRAN CARR begs most respectfully to thank the Metropolitan, Provincial, and Continental Gas Companies for their patronage for several years past, and to intimate that he has rebuilt and enlarged his extensive premises for the manufacture of CLAY RETORTS; and that he is now prepared to execute the largest orders with punctuality and despatch. Orders for FIRE-CLAY RETORTS, of all shapes and sizes, FIRE-BRICKS, and all other articles in Fire-Clay, executed on the shortest notice, and on the most reasonable terms.
London Agents: JAMES LAWRIE & CO.,
63, OLD BROAD STREET, CITY, LONDON.

THE "LOTHIAN" CANNEL COALS.
These Cannels are extensively used in the Gas-Works of Edinburgh, where the illuminating power of the gas is the highest in Britain.
The yield per ton is 12,573 cubic feet; illuminating power, 33·8 standard candles; coke per ton, 1046 lbs.
Ports of Shipment, in the Firth of Forth.

BO'NESS CANNEL COALS.—This Cannel is largely used in Gas-Works where, in addition to high illuminating power, there exists a demand for superior Coke, it being the best Coke-producing Cannel of all Scottish Cannels. It yields about 11,000 cubic feet of 25 standard candle gas per ton.
Ports of Shipment, either the Forth or the Clyde.
Apply to J. and W. ROMANS, 53, Frederick Street, EDINBURGH; and 1, Walbrook, Mansion House, LONDON.

LESMAHAGO GAS COAL,
AUCHINHEATH COLLIERY,
LESMAHAGO, N.B.

JAMES FERGUSON & CO.
LESSEES SINCE 1832.
LONDON AGENTS:
JAMES LAWRIE & CO.,
63, OLD BROAD STREET, E.C.
CONTINENTAL AGENTS:
LA COUR & WATSON,
LEITH.

MEDAL AWARDED, EXHIBITION, 1862, "FOR GOOD WORK."
THE IMPERIAL TUBE COMPANY, BIRMINGHAM,
MANUFACTURERS OF
WROUGHT-IRON TUBES & FITTINGS, BRASS & COPPER TUBES,
GALVANIZED & GLASS ENAMELLED TUBES & FITTINGS,
LAP-WELDED IRON & BRASS BOILER TUBES, ETC., ETC.
☞ Sole Makers of "HUGHES'S PATENT TAPS," Strongly recommended for all High-pressure purposes.—Price List and Testimonials forwarded on application.

CROLL'S DRY GAS-METER,
(INVENTED & PATENTED IN 1844,)
COMBINING ALL THE LATEST IMPROVEMENTS,
MANUFACTURED ONLY BY
THE GAS-METER COMPANY, LIMITED
238, KINGSLAND ROAD, LONDON, N.E.
A. ANGUS CROLL, C.E., Chairman. GEORGE RAIT, Managing Director.
PRIZE MEDALS. LONDON, 1851; NEW YORK, 1853; PARIS, 1855.
PRIZE MEDALS. LONDON, 1862; DUBLIN, 1865; PARIS, 1867.

HENRY HOWARD & CO.,

COOMBS WOOD PATENT TUBE-WORKS,

OLD HILL, near DUDLEY,

MANUFACTURERS OF

PATENT WELDED WROUGHT-IRON TUBES & FITTINGS,

FOR GAS, STEAM, & WATER, EITHER BLACK, GALVANIZED, OR ENAMELLED.

CORE BARS for IRONFOUNDERS, STOCKS, TAPS, & DIES, IRON COCKS, &c.

London Agents { W. G. DAVIS, 2, Brabant Court, Philpot Lane, E.C.
J. R. HILL, 73, Hatton Garden, E.C.

JOHN HALL & CO.,

STOURBRIDGE,

MANUFACTURERS of FIRE-BRICKS, LUMPS, & TILES,

AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.

N.B.—A Stock of 15 and 16 in. CIRCULAR RETORTS always on hand. Other kinds made to order on short notice.

SILVER MEDAL, PARIS EXHIBITION, 1867.

LLOYD AND LLOYD,

ALBION TUBE-WORKS, BIRMINGHAM,

MANUFACTURERS OF

WROUGHT-IRON TUBES AND FITTINGS

For Gas, Steam, Water, &c.

SOLE LICENSEES for the United Kingdom for the LAVENANT PATENT ENAMELLED TUBES & FITTINGS,

the Coating of which does not shell off, is a certain preservative from rust, and resists all effects of expansion and contraction.

LAP-WELDED IRON & HOMOGENEOUS METAL TUBES

For Locomotive, Marine, and Stationary Boilers.

Boiler-Tube Ferrules, Gun-Metal Gland Cocks, Water-Gauges, Whistles, &c.; Stocks, Taps, and Dies for Screwing, and Gas-Fitters Tools of all kinds.

London Offices: No. 4, Cloak Lane, Queen Street, E.C.

WAREHOUSES:

LONDON: No. 157, Upper Thames Street, E.C. LIVERPOOL: No. 4, Cooper's Row, and 3, Crooked Lane, Strand Street.
MANCHESTER: Barlow's Croft, Chapel Street, Salford. PARIS and LILLE.

BEST AND HOLDEN'S

PATENTS FOR CHARGING AND DRAWING GAS-RETORTS,

WITH CHAMBERS FOR MOUTHS,

REQUIRING NO LUTING.

Gas Engineers are solicited to examine into the merits of this invention before erecting new or altering old retort-houses. It may be seen in action at the Alliance Gas Company's Works, Dublin, where its utility and economy will be clearly demonstrated. Although the saving in labour will be considerable, and quickly return any outlay of capital, there are other and important features strongly recommending its adoption at all gas-works, and which a gas engineer upon examination will at once appreciate.

The Directors of the Alliance Gas Company have kindly consented to give every facility to gentlemen desirous of seeing the invention in operation. Parties, therefore, about to visit Dublin will be so good as to send us their card, and we will furnish them with letters of introduction.

Drawings, &c., may be seen at our Office, and all details explained.

JOHN CHISHOLM, SON, & CO., 44, MARK LANE, E.C.

D. BRUCE PEEBLES,

ENGINEER,

FOUNTAINBRIDGE WORKS, EDINBURGH,

PATENTEE AND MANUFACTURER OF THE

NEW TONGUE & GROOVE JOINTED

WET AND DRY GAS-METERS IN TIN-PLATE CASES,

Being the only Meters yet made of Tin-Plate in which Screws are used for the whole of the jointing instead of Solder.

Gas Engineers who have not yet seen these Meters are solicited to give a trial order, and personally to take one of them to pieces and refit it, as being the short and easy way of assuring themselves of the strength and excellence of the materials, the superiority of the workmanship, and, above all, the simplicity of construction and efficient method of jointing employed.

Strength and lightness combined, with ready access to all the working parts for cleaning or repairs, which may be done by any ordinary workman, render these Meters, wet or dry, well worth the attention of Foreign Gas Companies.

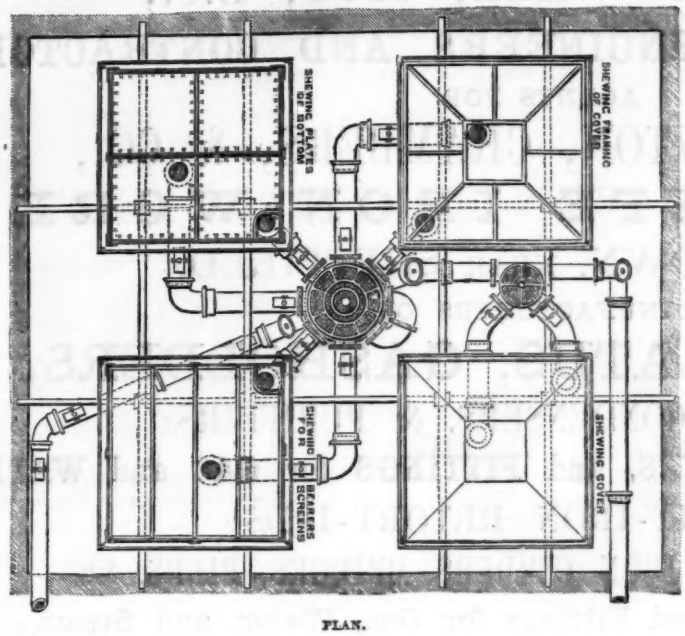
Wet Meters in Cast-Iron Cases, Station-Meters, Governors, Experimenting Meters, &c.

PRICE LISTS ON APPLICATION.

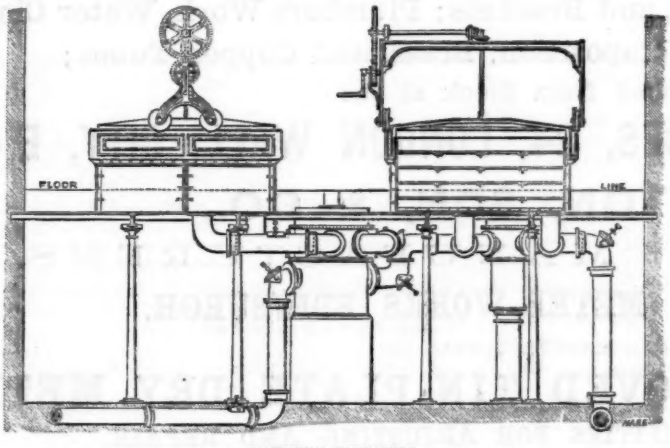
A PLAN & ELEVATION OF GAS PURIFIERS

WITH

COCKEY'S PATENT VALVES.



PLAN.



SECTIONAL ELEVATION.

DESCRIPTION OF PURIFIER ARRANGEMENT.

The plan shows four Purifiers: three of them are worked in rotation by means of a central Valve, so that two are always in use, and the third always out of use for cleaning. By another arrangement of the Valve, either one, two, or three Purifiers may be used together.

The fourth Purifier is used as a guard, with a separate Valve, and is useful in preventing any slightly impure gas, which may have escaped in turning the central Valve, passing in that state to the gasholder.

This system has been found to work well in many gas-works, and in addition to the advantage before stated, it affords a ready and convenient mode of using oxide and lime together for purifying.

By the introduction of a bye-pass, the system is made more perfect, inasmuch as the central Valve, with its connected Purifiers, may be shut off for repair, and the gas passed temporarily direct to the fourth Purifier.

The Valves which are here introduced have now been in use for more than ten years, and have been tested in sizes varying from 3-inch to 16-inch. The increasing demand for them is the best proof which can be given of their satisfactory working and general usefulness.

More than 350 of them have been fixed. They are suited for various parts of gas apparatus, and are especially available for bye-pass connexions. They are also introduced with much advantage for the inlet and outlet connexions of gasholders, and simplify very much the changes where more than one gasholder is in use.

They are durable and easily reground without removal from their connexions, and in a few hours they may be made as good as new after many years wear.

The patentees are prepared to furnish plans, specifications, and estimates, either for the entire construction and erection of gas-works, or for the rearrangement of any part of the apparatus. The Valves are manufactured at the works, at Frome, where also Gasholders, Purifiers, Steam-Engines and Exhausters, Governors, and all other descriptions of Gas Apparatus are made and supplied.

EDWARD COCKEY & SONS.

THE IRON-WORKS, FROME SELWOOD,

March 1, 1869.

NORTH BRITISH ASSOCIATION OF GAS MANAGERS.

The Committee of this Association have much pleasure in intimating that, through the liberality of several gentlemen connected with Gas Engineering, they are enabled to offer

PRIZES FOR ESSAYS

on the subjects after-mentioned, and for which they earnestly invite competition.

The Awards to be made at the Annual General Meeting in July next.

The subjects are:—

1. "On the best mode of carbonizing coal, taking into account condition of coal, size of retort, weight of charge per retort, duration of charge, and whether the mixture of coals in retorts is recommended or not."

1st Prize	£10	10	0
2nd do.	5	5	0
3rd do.	2	2	0

2. "On the best method of constructing and setting a bench of fire-clay retorts, having special reference to the size, shape, and thickness of retorts."

1st Prize	£6	0	0
2nd do.	4	0	0

Competition open only to Managers of Gas-Works in Scotland, in receipt of salaries of £200 (and under) per annum.

Essays, and any accompanying drawings, to be lodged with the Secretary not later than the 15th of May, 1870.

WM. MACKENZIE, Hon. Sec.

Gas-Works, Dunfermline, Dec. 30, 1869.

THE

HUCKNALL COLLIERY COMPANY

Can offer a CANNEL COAL yielding a large quantity of Gas of superior quality.

Prices and information on application to the HUCKNALL COLLIERY COMPANY, Hucknall Torkard Collieries, near NOTTINGHAM.

BRONNER'S PATENT GAS-BURNERS

give 99 per cent. of light, as compared with 27 per cent. given by ordinary burners, with equal consumption of gas.—*Vide* "Gas Referees Report," published June, 1869.

HENRY GREENE AND SON, Sole Consignees of Brönner's Patent Improvements in Gas Lighting, 16 and 17, King William Street, E.C., and 139, Regent Street, LONDON. Agents wanted.

THOMAS BEAR,

MICA, TALC, AND ASBESTOS MERCHANT,

233, HIGH STREET, BOROUGH, LONDON.

PRICES FOR MICA GAS COVERS.

7-inch Mica Gas Covers	84s.	per gross.
6½ " "	72s.	"
6 " "	60s.	"
5½ " "	50s.	"
5 " "	42s.	"
4½ " "	36s.	"
Argand for Gas Covers	30s.	"
Do. Paraffin Lamp	30s.	"

Carriage paid to any part of England, Ireland, and Scotland.

A remittance must accompany all orders, net cash.

P.S.—Not less than one gross assorted forwarded.

FOR SALE, the Apparatus of a small Gas-Work, comprising Retort-House Fittings, Condenser, Scrubber, Purifiers, Station-Meter, Gasholders, Governor, Valves, and sundry Connexions.

Also a GASHOLDER (counterbalanced), 30 ft. by 16 ft., with cast-iron tank (by Piggott), and an annular condenser, 17½ ft. high, in four sections, and 24-in. outside and 16-in. inside pipes.

The whole being put out of use from recent enlargement of works.

Particulars may be obtained on application to Mr. S. W. DURRIN, Gas-Works, SOUTHAMPTON.

GAS PURIFIERS FOR SALE.

IN consequence of Enlargement, a Set of Four Cast-Iron PURIFIERS, 6 ft. by 4 ft. 3 in., with four tiers of riddles in each, lids, centre-valve, 7-in. connecting-pipes, and crane for removing lids, all complete and in working order.

Apply to THOS. BELL, Gas-Works, SELBY.

GASHOLDERS.

THE Directors of the Rochester, Chatham, and Strood Gaslight Company will be glad to receive OFFERS for the two undermentioned GASHOLDERS—the First, 42 ft. 6 in. by 13 ft., in annular cast-iron tank, with six columns, chains, and counterpoise weights, as now standing, in complete working order, at their Chatham Station; the Second, 35 ft. by 16 ft., with cast-iron plates to form tank, 35 ft. 6 in. by 15 ft., sheets, framing, six columns, guide-rollers, &c., as recently taken down, and now lying at their Gillingham Station.

Terms may be known and the Gasholders viewed by application to WILLIAM SYMS, Secretary, 56, High Street, ROCHESTER.

THE Directors of the Mansfield Gaslight and Coke Company desire to receive separate TENDERS for the construction of a TANK, and for a Telescope GASHOLDER, with all necessary fittings, &c., at their works in Mansfield.

The plans and specifications may now be inspected, and bills of quantities for the Tank examined, or obtained on payment of 10s., at their Office.

Tenders to be delivered at the Office of the Company on or before Wednesday, the 26th day of January, 1870.

Dec. 27, 1869.

TO IRONFOUNDERS.

THE Oldham Corporation Gas Committee are prepared to receive TENDERS for supplying and fixing a SET of PURIFIERS.

Plans and specification may be seen at the Gas Offices, Oldham.

Tenders to be sent in on or before Tuesday, Jan. 25.

The lowest or any tender not necessarily accepted.

JAMES TAYLOR, Manager.

Gas Offices, Oldham, Jan. 12, 1870.

THORNELOE AND COMPANY,

34, LONDON WALL, CITY, E.C.,

GAS AND WATER ENGINEERS AND CONTRACTORS.

AGENTS FOR

MESSRS. NEWTON, CHAMBERS, & CO.,

THORNCLIFFE IRON-WORKS,

CHAPELTOWN, NEAR SHEFFIELD,

MANUFACTURERS OF

GAS APPARATUS, GASHOLDERS,

SCRUBBERS, CONDENSERS, & PURIFIERS;

IRON MAIN PIPES, VALVES, and FITTINGS for GAS and WATER;

WROUGHT-IRON RETORT-LIDS;

WROUGHT & CAST IRON GIRDERS, BRIDGES, PIERS, &c.

Wrought-Iron Tubes and Fittings for Gas, Water, and Steam;
Chandeliers, Pendants, Lamps, and Brackets; Plumbers Work, Water Closets,
Pumps, &c.; Lead, Composition, Brass, and Copper Tubes;

Supplied from Stock at the

WAREHOUSE & OFFICES, 34, LONDON WALL, CITY, E.C.

FULLERTON, SON, & CO.,

GAS-METER MANUFACTURERS,

LONDON ROAD METER-WORKS EDINBURGH,

SOLE MANUFACTURERS OF

THE PATENT IMPROVED TIN-PLATE DRY METER,

WITH SPECIAL FACILITIES FOR ADJUSTING AND REPAIR,

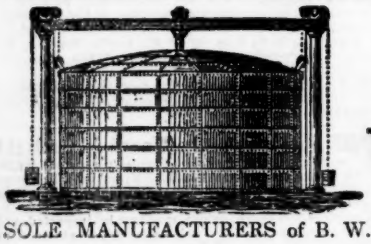
The principal parts of the mechanism being accessible by the removal of a single screw.

GAS-METERS on the WET and DRY principles made in CAST-IRON and TIN-PLATE CASES.

STATION-METERS, GOVERNORS, EXPERIMENTAL & TEST METERS, GAS APPARATUS, &c.

LONDON AGENTS: THORNELOE & CO., 34, London Wall, City, E.C.,

Where Meters are supplied to order from Stock.



IMPROVED GAS APPARATUS,

FOR CITIES, TOWNS, VILLAGES, &c.,

INVENTED AND MANUFACTURED BY

W. C. HOLMES & CO.,

WHITESTONE IRON-WORKS, HUDDERSFIELD.

SOLE MANUFACTURERS of B. W. THURSTON'S IMPROVED SCRUBBER, CONDENSER, and WASHER, in use in many of the principal Gas-Works on the Continent.

PATENTEES of the IMPROVED COMBINED PURIFYING APPARATUS, so eminently adapted for Exportation.

ESTIMATES, PLANS, and SPECIFICATIONS PREPARED for BUILDINGS and APPARATUS.

Prospectus, Price Lists, &c., on application.

LONDON OFFICES—57, GRACECHURCH STREET, CITY.

*** *Please address letters to Huddersfield.*

REFERENCES TO NEARLY 300 GAS-WORKS.

TANGYE BROTHERS & HOLMAN,

ENGINEERS, MACHINERY AGENTS, AND MANUFACTURERS,

10, LAURENCE POUNTNEY LANE, LONDON, E.C.;

And BIRMINGHAM (TANGYE BROTHERS), CORNWALL WORKS, SOHO.

SOLE MAKERS OF

MORTON'S PATENT SELF-SEALING RETORT-LIDS.

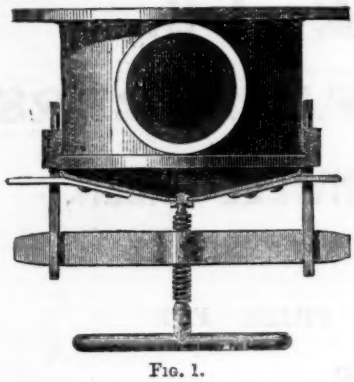


FIG. 1.

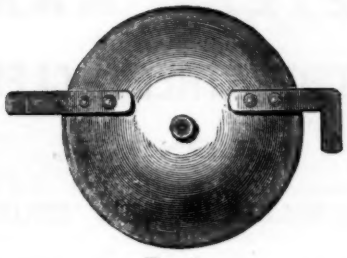


FIG. 2.

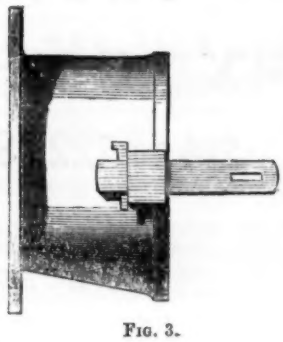


FIG. 3.

Several Hundreds in successful operation in various Gas-Works.

The expensive and cumbersome process of sealing the mouths of Gas-Retorts by means of luting the Lids with lime and other materials hitherto used for that purpose, is henceforth rendered unnecessary, and will be superseded by the very efficient method shown in the accompanying illustrations.

Fig. 1 shows a plan of a mouthpiece with Morton's Patent Lid in section. The mouthpiece is faced true, and the projecting circular edge or periphery of the lid is also turned true, and, by preference, of a semicircular section, so that the point of contact is reduced to a minimum; the convex form of the Lid rigidly sustains the force of the screw, which, by its central action, gives the Lid a uniform bearing, and effectually seals the mouth of the Retort.

Fig. 2 shows a front view of Morton's Patent Lid, which is stamped out of plate iron, having (in this case) ledges to rest on the lugs of the mouthpiece; these Lids, however, are more generally fitted to hinged cross-bars, by which means they remain suspended while the charge is withdrawn and the Retort charged, so that the damage done by throwing them about is entirely prevented.

The advantages obtained are—

1st. The sound sealing of the Retort during the whole time it is carbonizing the charge of coal, there being no jointing medium between the Lid and the mouthpiece.
2nd. The improved condition of the coke by the non-mixture of lime.
3rd. The Lid requires no preparation on the part of the stoker, beyond slightly scraping the surface to remove extraneous grit or dirt.
4th. The Lids are only about two-thirds the weight of the old form in general use, a Lid for a 16-inch mouthpiece weighing a little over 20 lbs.
5th. The Self-sealing Lid reduces labour, saves wear and tear, obviates all the inconvenience and discomfort consequent on the preparation of luting, and effects a great reduction in the working expenses. The cost attending the process of "luting" in several large gas-works, exceeds £1000 per annum, ranging in various works from 20s. to 35s. per mouthpiece.

It will be obvious that a round Lid is the most convenient and the cheapest form. D Retorts are adapted for round Lids, by carrying the bottoms down the necessary depth for that purpose, as shown in Fig 3. Some mouthpieces have been thus adapted, and are in use at the Chartered Gas-Works.

The following testimony speaks in favourable terms after ample and careful test:—

Burslem and Tunstall Gas Company, Longport, Staffordshire, Oct. 12, 1869.

Dear Sir,—In reply to your favour of the 9th inst., I have pleasure in stating that my admiration for your Patent Retort-Lid is most unqualified. I have 14 of them in use, and have tested them in the severest manner possible at these works, but without being able to detect the slightest defect. Yesterday the strap slipped off the exhauster, and a pressure of 13 inches was thus almost instantly thrown upon the Retorts, but although many of the luted Lids were leaking, not the slightest escape was observable from yours. I had anticipated that at least some greater degree of care would have been required in the scraping of the mouthpieces after the drawing of each charge, but even in this particular I find that labour has been reduced.

By every stoker on these works, as well as by myself, your Lids are regarded as a boon.

Please send me 30 more at your earliest convenience.

R. Morton, Esq. I am, &c., (Signed) HENRY WOODALL.

Chartered Gas Company, Horseferry Road, Westminster, Sept. 15, 1869.

Dear Sir,—I have only lately returned to town, which is the reason I have not replied earlier to your inquiry.

I beg to say that I have had your Lids in use for upwards of two months, and during that time they have always kept a perfectly sound joint. I may add that where your lids are used only one set is required.

R. Morton, Esq. I remain, &c., (Signed) G. O. TREWBY.

Chartered Gas Company, 146, Goswell Street, E.C., Oct. 20, 1869.

Dear Sir,—I have much pleasure in stating that, after some months trial of your Retort-Lids, I find them everything I could desire. I consider the plan a great improvement.

R. Morton, Esq., London Gas Company. I am, dear sir, yours truly, (Signed) A. UPWARD.

These Lids are in successful use at the London Gas-Works, the Chartered Gas-Works, the Dublin Gas-Works, the Burslem and other Works, giving great satisfaction.

Application for Licences and other Information to be made to

TANGYE BROS. & HOLMAN, 10, Laurence Pountney Lane, London, E.C.

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UNIVERSAL EXHIBITION OF PARIS,

1867.

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PROVINCIAL GAS AND WATER COMPANIES.

The following corrections arrived too late for insertion in the Share List published on Jan. 4:—

Number of Shares issued.	Amount per Share.	Name of Company.	Amount paid up per Share.	Dividend per Cent. per Annum.	Last Quotation.
	£	GAS COMPANIES.	£ s. d.	£ s. d.	£ s. d.
19,000	10	*Dublin Alliance*, A shares	8 0 0	7 0 0	12 10 0
10,000	10	Ditto, B shares	5 0 0	7 0 0	6 17 6
13,500	10	Ditto, No. 1 C shares	10 0 0	7 0 0	14 15 0
12,500	10	Ditto, No. 2 C shares	4 0 0	7 0 0	5 17 6
800	5	Kidsgrove	5 0 0	10 0 0	7 10 0
400	10	Lymm	9 0 0	7 0 0	11 0 0
1,800	20	*Warrington*	20 0 0	10 0 0	38 0 0
2,400	5	Wrexham	5 0 0	10 0 0	8 10 0
		WATER COMPANY.			
3,000	10	Warrington	10 0 0	7 10 0	15 0 0
3,000	5	Ditto	5 0 0	7 10 0	6 10 0

SPECIAL NOTICE.

Subscribers who have not paid their subscriptions for the year 1869, or for any previous years, are requested to remit the same forthwith, in the manner indicated below, in order to prevent any interruption in the regular delivery of the Journal; and such subscribers as desire to avail themselves of the reduction by paying in advance, must do so in the course of the month of January, 1870.

NOTICES.

The subscription to the Journal is 15s. per annum, if paid in advance during the month of January, or 18s. credit, in two sums of 9s. each, in July and January of each year. Post-Office orders should be made payable at the Money-Order Office, London, to William B. King, 11, Bolt Court, Fleet Street, by whom the business department of the Journal is conducted.

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All communications for the Editor to be addressed, "No. 42, Parliament Street, Westminster;" and all remittances for subscriptions or orders for advertisements to the Publisher, No. 11, Bolt Court, Fleet Street.

THE JOURNAL OF GAS LIGHTING, WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, JANUARY 18, 1870.

Notes upon Passing Events.

Barking is a miserable village on a creek flowing into the Thames. It once had a little commerce in the visits of fishing-boats, which halted there on their way to Billingsgate; but railroads, which opened a direct communication between the east coast and London, destroyed it. Cargoes of fish are now no longer kept in the wells of boats, but sent direct, as soon as landed at Hull or Great Grimsby, Yarmouth or Harwich. Barking has no municipal authority in any shape—no Board to regulate its sewers, or even to keep its streets and footpaths in order—yet this wretched place, with a little assistance from incompetent Government-appointed officers, has just put the country and the ratepayers of London to an enormous expense. We have before us a folio Blue-Book, with a handsomely engraved map of the Thames, which contains "a report as to the truth of certain allegations "contained in a memorial from the vicar and certain inhabitants "of Barking." To inquire into this memorial Mr. Robert Rawlinson, C.B., was sent down, and there appeared before him as witnesses, amongst others, some half dozen of the most eminent engineers of the day. The really important question was whether, as the engineers of the Conservators of the Thames alleged, the navigation of the Thames was being gradually shoaled up by the deposits from the great northern outfall of the metropolitan main drainage—a matter of fact which one would have thought could have been ascertained without so expensive and circuitous an inquiry. The complaints that Barking is afflicted by new smells in addition to old accustomed stinks, that fish of the creek—flounders or dabs—are rendered scarce, that bathing is made impossible by the contamination of metropolitan sewage, are simply so childish that they need no further consideration. But what are we to think of Mr. Leech, the engineer of the Thames Conservators, who calculated "the sewage detritus deposited in the Thames at "Barking at 700,000 cubic yards, and the cost of dredging and "landing the same at from £20,000 to £60,000 a year?" He was confirmed in this estimate by Captain Burstall, R.N., the secretary to the conservators. On the other side, Mr. Bidder calculated that the total annual detritus did not exceed about 90,000 cubic yards; while Mr. Haywood, without communicating with Mr. Bidder, estimated it at 92,000 cubic yards. If, then, as Mr. Bidder pointed out, by some miracle all the detritus had been deposited at Barking Creek, it would not have amounted to half Mr. Leech's estimate in three years. Thus, on consideration, we find that there might be something worse than an expensive inquiry about a trumpery matter, and that would-be autocracy of inefficient Government officials. It is so much easier to establish an autocracy than to ensure efficiency in official appointments. Besides Mr. Bidder and Mr. W. Haywood, there were called, amongst engineering witnesses, at fabulous expense, Mr. C. H. Gregory, president of the Institute; Mr. Hawkshaw, Mr. Hawksley, and Mr. Hemans, and, as scientific chemists, Dr. Miller, F.R.S., and Dr. Odling. Of course there are some plums in such a rich array of evidence. For instance, Mr. Bidder, talking about what he really does understand, very neatly describes the difference between the old system and the present system of disposing of the sewage of London. "Under the old system the "London sewers commenced delivering into the Thames as soon "as the river water fell below the level at which the sewage had "been penned back into the sewer; and they continued to "deliver sewage into the Thames through the whole of the

"ebb and flood, until the water rose sufficiently high to "block and retain the sewage in the sewers. That part of "the sewage came into the river in substitution of tidal water. "The upper reaches had to be filled, and sewage helped to fill "them." Now, under the main drainage system, "the sewage "water is penned up in the outfall reservoir until forty minutes "after high water, and it is then delivered to the ebbing tide "within the space of about two hours—that is to say, to about half "tide. The result is that all the water that has been pent up "is then delivered, in addition to the outward scour; therefore, "you increase the upward scour by increasing the volume of tidal "water, and you promote the downward scour in delivering all "the sewage that is in substitution of tidal water, at that period "of the tide when the effect is most beneficial." The advantages of this system are so obvious (so long as they are properly carried out mechanically—so long as the means are not found for applying London sewage to cultivation), that any little inconvenience to which the boatmen about Barking may be subjected, may well be passed over. After this evidence on a subject he thoroughly understands, Mr. Bidder proceeded to give his opinions as to the value of sewage for agricultural purposes—a subject on which his knowledge is very superficial, and not worth twopence, except for the authoritative manner in which he delivers himself on all questions. Mr. Hawksley gave evidence that under the old system a large quantity of the road-drift or detritus went into the river; now, under better arrangements, it is intercepted, and comparatively little finds its way there. The commissioner, of course, comes in for a snub. He asked: "Did Mr. Bidder mean "20,000 gallons of river water to 1 gallon of sewage?" To which Mr. Hawksley replied in his pleasant way, "I was not present to hear "what Mr. Bidder said. Of course I do not know what he meant." Mr. Horace Lloyd did not get much better off. He said: "As "to the people of Roding, are you aware that they do *not* drain "into the river?" Mr. H. replied: "I am perfectly aware that "they *do*, because I made some of the sewerage works myself." Other passages of arms were not less amusing. When Mr. Haywood was called, he was examined as to the parallel that had been drawn between the large deposit of road sweepings that is found in Birmingham sewage, and the assumed deposit of London road sweepings which Mr. Leech and Captain Burstall *imagined* they had found near Barking Creek. The City engineer's practical knowledge explained the Birminghan case. "Birmingham," he "said, "is macadamized with a stone having neither the specific "gravity nor the hardness of granite, more easily crushed and more "easily washed away. Birmingham is a town with steepish "gradients, and a few years ago the surveyor told me that his "system was to shoot all his street sweepings into the sewers and "then flush it away. . . In the metropolis year by year the "tendency is to keep the roads and streets cleaner, and to keep "detritus out of the sewers. I do not mean to say that some "road-drift does not go into the river through the new intercepting "sewers, but to a very small amount. If there were any great "quantity the pump-valves would soon find it out." Well, since Mr. Haywood spoke, the syphon at Barking has found something out that did not pass into the river. Thus the conclusion to which we are irresistibly brought is that, although there is some nuisance to the dwellers by Barking Creek, as might be expected, from the outfall arrangements, it is not of sufficient importance to justify the expenditure of any further sum on the main drainage; that as to the charge of impeding the navigation of the Thames, it is altogether imaginary. The bank of mud which has been created, and which does *not* impede the navigation, is clearly the result of a landing-pier sanctioned by the Conservators of the Thames.

But although we agree that, if the sewage of London must go into the river, the Abbey Mills pumping-station was well chosen, we are bound to add what did not come before the commissioner. The pumping arrangements at Abbey Mills are a total failure. An explosion which has burst the syphon, split the towers, and done altogether at least £10,000 worth of mischief, has been kept wonderfully dark in the engineer's reports to the Metropolitan Board. It has been called "simply the explo-"sion of an air-chamber," but the buildings have ever since been closed to the public. It will be remembered that, about a year ago, the orgies with which certain vestrymen celebrated the completion of the Abbey Mills pumping-station and reservoir excited some sensation, as well as the absurdly costly internal decorations. One of the features of the show was the reservoir of several acres, in which the sewage of the northern side of the metropolis is impounded daily until the time comes for discharging it into the Thames. At one end of this reservoir is a grating dividing it from what may be for convenience called the well-hole of the syphon. According to the engineer's theory, this grating would pass not only all sewage, but all detritus, and retain only such insoluble matter as brick-ends, tin kettles, and other miscellaneous contents of our sewers. So far from this being the case, while the liquid and solid sewage passed through, tons of brick-ends, oyster-shells, fragments of metal, of wood, cane, sacking, cloth, &c., accumulated, and formed with the road washings a solid composition to the extent of thousands of tons, and there remains—or at any rate was to be found a few days ago—impenetrable to a spade. No engineer or sub-engineer appears to have noticed the growth of this mass, until one day the overtaxed air-vessel split, while the same force cracked all the buildings. Entirely new arrangements must be made for getting rid of the materials which, although flushed through the sewers, sink when they reach the reservoirs, and form a concrete of a new and very unmanageable description. There must be an inquiry into the cause of this accident, of course. This is a serious imputation on the skill, foresight, and vigilance of the engineer and his assistants. The question will then again arise whether after all it will not be wiser to divert the sewage to the land instead of to the river. The cultivation at Lodge Farm has sufficiently proved that sewage can be profitably applied to the cultivation of inferior soils, where there is a demand for roots and market-garden produce as well as for green fodder. But the public have no confidence in agricultural companies. They never have had any taste for land speculations. Mr. William Hope, the promoter of the schemes for turning Maplin Sands into farms and vegetable gardens, having failed to raise capital in the open market, asks for a guarantee of some 4 per cent. Now it is quite certain that no public Board would be justified in risking any capital or income in a reclamation scheme. But the Metropolitan Board, looking at the large number of chances in favour of the profit that might be derived from the application of metropolitan sewage to cultivation, might wisely consider the propriety of guaranteeing interest on the amount required for the works, which would deliver the stream, now turned into the Thames, at Maplin or some other suitable spot. The value of such an investment is a proper subject for investigation. As to the merits of the Maplin scheme of reclamation, Mr. Hemans endorses it; indeed, we believe he designed it. Mr. Bidder condemns it; but then he was not consulted. Nothing has been done; there is plenty of time to have the plans recast, if the promoters consider Mr. Hemans's way of doing business too off-hand and Irish. If we were advising Mr. Hope and his financial friends, we should say that, having had the full use and benefit of Mr. Bazalgette's friend, we should now cross over and place Mr. Bidder in the position of adviser-in-chief. In that position it is possible that the difficulties he now sees as big as mountains would become as small as molehills. But then to engage this engineer-in-chief, whose works are cheap, would require a big fee, and Mr. Hope and his friends have at present no money for fees in four figures.

The debate in the Metropolitan Board on the water-works question, still unfinished, has brought the real question into a very small compass, the solution of which will most probably rest with the water companies themselves. The idea of abandoning the sources of supply which have never failed, and undertaking a Cyclopean work, in bringing water from Welsh or Cumberland lakes, is given up. These engineering dreams have been dispelled by the commissioners report. The subject is narrowed to whether the existing water companies shall be bought up by the Metropolitan Board, or some other public body, and whether the system of constant supply, which some private companies carry out, shall be introduced into the metropolis. The first question may be left to public opinion to settle. Ten millions is a large sum. If the water companies are compelled to sell, they must be paid like the telegraph companies, who have had no reason to repent their bargain. It is an excellent precedent. As to the constant supply, if the companies are wise they will not wait for compulsion, but cast their prejudices on one side, and grapple with it in a willing spirit. Let them begin by saying what it is necessary for householders to do, before their dirty cisterns are replaced by ever-yielding taps. At present, the older engineers of older companies meet every suggestion in a papal spirit—with an obstinate *non possumus*. Now, in this generation, this principle will not do. Of course, as this is a sanitary question, we have the usual fallacies repeated. Mr. Newton, supported by a newspaper that is usually better informed—the *Echo*—repeats the delusive story about the model water supply arrangements of Manchester. It is true that the water-works of Manchester ought to be models, as they were constructed with the advantage of the experience of more than a century in other works. But, as a matter of fact, in the summer of 1868, while the London companies were able to afford a regular supply of good water, the Corporation works of Manchester, and all the towns of the northern manufacturing districts supplied on the same principles, were only able to afford a limited supply of water of very bad quality. The Corporation of Manchester has ever since had to meet enormous claims for compensation to millowners who had been deprived of their stipulated allowance. Sir Joseph Heron, under cross-examination, would draw a very unsatisfactory picture of the Manchester

Water-Works in years of drought, either in their relation to water or to profit.

Seekers and holders of seats in popular constituencies at the present day, whether advanced Radicals or Conservatives of the most decided type, agree in basely flattering the working man, especially the working man of the metropolis. In the metropolis every one who employs labour—at any rate in the building trade—can prove that a large amount of distress amongst skilled mechanics is the inevitable result of their mode of life. In the fine weather there are thousands who work, strike on slight provocation, make Saint Monday, and spend the week's wages every week, in full reliance on the many charities so profusely and competitively administered in London, or at the worst on the workhouse. The cause of modern pauperism, as a rule, is modern extravagance, for there is not one class of wages-earning workmen, including agricultural labourers, that is not lodged, clothed, and fed 40 per cent. better than forty years ago. On this point Mr. Baines gave some useful figures in his speech at Leeds the other day.

Poor-rates have enormously increased. Well, has pauperism increased? I grant you that we spend a much larger sum on our poor per head than we did twenty years ago; but have we a larger number of paupers now than we had formerly? That is the question to ask ourselves. Now, the fact is, that in 1849 we had one pauper in every 16 of the population; in 1868 we had one pauper in every 23 of the population—showing that, in proportion to the population, we have fewer paupers now than we had twenty years ago. Our increased expenditure comes in this way—that we spend on our children in the industrial schools 11s. or 12s. a week each; that we spend on our old people, on our pauper lunatics, on our sick paupers, much more than we used to spend; that, in fact, we take better care of them. Again, they argue that we are getting much poorer than we were—that we are getting poorer every day. Why, in 1845 personal property in this country was valued at £2,200,000,000; it is now valued at £6,000,000,000. In 1847 our annual income from all sources was said to be £380,000,000; it is now nearly £800,000,000 per annum; yet in 21 years we have invested in churches, in chapels, in mills, in railways, in schools, no less than £1,000,000,000.

THE USE OF HEAVY OILS AS FUEL IN LOCOMOTIVES.

M. H. St. Claire Deville has been engaged since 1867 in making experiments on the application of mineral oils to heating purposes, in the course of which he has tried various samples from America, Java, Parma, and Bechelbronn, and also heavy oil from the tar of the Parisian Gas Company. In the memoirs referred to below* will be found a full description of the physical properties and chemical composition of these various oils, and also of the arrangements employed to effect their combustion. The following relates chiefly to the heavy oil of the Parisian Gas Company. This oil is of a dark brown colour; its specific gravity at 32° Fahr. is 1·044, and at 88° Fahr. 1·007. In round numbers, 22 gallons will weigh 2 cwt., and it is sold for 50 francs (£2) per ton. Heated up to 302° Fahr., it merely loses a little moisture; and when the temperature is further raised to 424° Fahr., only 12·5 per cent. of various matters is driven away. The oil does not freeze at 12° Fahr., and a lighted torch plunged into it is immediately extinguished. The composition of the oil is as follows:—

Carbon	82·0
Hydrogen	7·6
Oxygen, nitrogen, and sulphur .	10·4
	100·0

The coefficient of expansion of this oil is 0·000743. The composition of the twelve crude oils analyzed by M. Deville varied within the following limits:—

Carbon . .	from 82·0 to 87·1 per cent.
Hydrogen . .	„ 7·6 „ 14·8 „
Oxygen, &c. .	„ 0·9 „ 10·4 „

The densities at 32° Fahr. ranged from 0·786 (the Parma oil) to 1·044 (the heavy oil of the Paris Company).

The coefficient of expansion ranged from 0·000652, that of the Java oil, to 0·00106, that of the Parma oil, which, for a rise of 212° of temperature, represents an increase of volume ranging from 6·52 to 10·6 per cent.

The most volatile oil was the Pennsylvanian from Oil Creek, which at 212° Fahr. lost 4·3 per cent.; at 284°, 33·3 per cent.; and at 356°, 38·7 per cent. In the case of the Parma oil, the loss at the same temperatures was respectively 1·1, 33·3, and 60·5 per cent. The least volatile was that from the Alleghany River, the loss in which up to 266° Fahr. was scarcely appreciable, and at 356° Fahr. only amounted to 12 per cent. From the above figures it is seen that the heavy oil of the Parisian Gas Company is one of the least volatile, is the poorest in carbon and hydrogen, and the richest in oxygen, while it is the only one that contained nitrogen and sulphur. It has also the highest density, with nearly the lowest expansibility.

The first experiments of M. Deville were made in the laboratory of the Ecole Normale, with the small boiler of a locomotive of 6-horse power. The principal object of these was to ascertain the calorific power of some of the oils.

In 1868 experiments with the tar oil were commenced on board the Emperor's yacht, *Le Puebla*, the engines of which are of 60-horse power. The practical results obtained on these experiments quite agreed with the theoretical results obtained at the Ecole Normale.

Soon afterwards trials were made with a locomotive placed at the disposal of M. Deville by the Strasbourg Railway Company. The superintendence of these was confided to M. Dieudonné, an engineer of the company, to whom we are indebted for the following particulars:—

The engine selected was No. 291, a machine with uncoupled wheels and outside cylinders, weighing when complete about 20 tons, and with a tender weighing 15 tons. The weight on the driving-wheels was about 16 tons. Including fireplace and tubes, the heating surface was about 72 square yards. Engines of this pattern are principally employed in the passenger traffic on branch lines between Flambouin and Montereau, and Flambouin and Provins, lines with slight gradients. The trains are usually made up of ten carriages, and the consumption of Prussian coal is about 20 lbs. for every two-thirds of a mile.

A tank to hold the oil was placed upon the cylindrical part of the locomotive, so that the furnace could be fed by simple gravity; but, as this tank could not hold sufficient for the journey, a further supply was carried on the tender, from which it was pumped into the tank on the engine. The fire is lighted by burning some shavings and sticks on the floor of the fireplace just before the grate, and introducing at the same time a small quantity of oil.* As the draught of air was necessarily very slight when the engine was stationary and without steam, a jet of steam from the blow-off pipe of another engine was sent into the chimney. Aided in this way, steam was got up in an hour and a quarter, and in about half the time it took when coal was used, with the consumption of 11 gallons of oil. Steam, however, could be got up without any assistance from another boiler in 2¾ hours, with the consumption of 12½ gallons of oil; but a large quantity of black smoke was produced.

The engine made its first experimental trip alone on the 30th of July, 1868, the journey being from Epernay to Châlons, a distance of about 11 miles; and it was found that a speed of 40 miles an hour could be attained with the consumption of a little over 9 lbs. of oil for every two-thirds of a mile.

The draught obtained while in motion by the air of the escape-pipe, and while stationary by the blow-off pipe, was regulated much as it usually is when coal is employed. The flame produced by the heavy oil is very fierce, and only about 6 inches long; but the products of combustion, although invisible beyond that distance, are sufficiently hot to render incandescent a platinum wire of considerable thickness.

On the return trip another locomotive and its tender, weighing together 50 tons, were attached, and with these a speed of 40 miles an hour was obtained by the consumption of 10½ lbs. of oil per kilomètre (two-thirds of a mile).

In a second trip between Epernay and Châlons the engine drew a train of eleven goods trucks weighing about 70 tons. A train in advance interfered with the speed, and an hour was occupied in traversing the distance of 11 miles, the consumption of oil rising to about 21 gallons. On the return trip with the same train a speed of 40 miles an hour was obtained by the combustion of about 11 lbs. of oil for every two-thirds of a mile. These trips proved that the furnace could be easily managed, and accommodated to unexpected stoppages and sudden changes of speed.

On the 13th of August, 1868, the engine made another trip by itself, and the consumption of oil was only about 5 lbs of oil for two-thirds of a mile.

A fourth trial was made on the 20th of August, between Châlons and Mourmelon, with a train of eight empty carriages. On this line there is an incline of 12 in 1000. The average speed was 30 miles an hour, and the journey to and from was accomplished without any difficulty.

Lastly, the same engine was employed for some days on the same line in drawing a train of four saloon carriages and one baggage waggon, the Emperor being present at the trials. The results were equally satisfactory.

From the foregoing experiments it is concluded:—

1. That in engine No. 291 it was possible to get up steam very quickly when the draught was assisted by steam from another boiler; and that without this aid sufficient pressure could be obtained in about the same time as with coal, with a rather larger consumption of oil, and the production of some smoke.

* *Comptes Rendus de l'Académie des Sciences*, tom. lxvi., March 9, 1868; tom. lxviii., pp. 349, 485, 686; tom. lxix., p. 933.

* The grate, we may say, consists of 20 bars of iron, cast in one piece, with channels for the oil to run down, and set perpendicularly before the fireplace, which is lined with fire-brick; a separate tap supplies the oil to each bar of the grate. A full account of these arrangements will be found in the *Comptes Rendus* referred to.

2. That the management of a furnace fed with oil offers no special difficulties, while the production of steam, and consequently speed and work, is at least equal to that obtained with coal.

3. That the expenditure of heavy oil is on the average about 11 lbs. for two-thirds of a mile for the normal work of the engine; and as about 22 lbs. of Prussian coal is consumed for the same work, it follows that the consumption of oil is just half that of coal.

Experiments with this engine have been discontinued, in consequence of the brick lining of the furnace having been damaged by the intense heat. [Others have since been made with another engine (No. 191) of slightly different construction, the results with which completely confirm the foregoing.]

It will be of interest to continue these researches, and somewhat extend the field. For example, it will be well to determine the quantity of water evaporated by a given consumption of oil, and compare it with the quantity evaporated by a known weight of coal.* It is advisable also to determine the temperature of the gases escaping from the chimney, in order to ascertain how far the heat developed has been utilized; and also to determine the composition of the gas, to see whether the combustion of the oil has been complete. Lastly, it will be well to ascertain by a prolonged experiment how the furnace and tubes behave under the influence of the flame of the oil; and, in fact, collect a variety of data which the short duration of the foregoing experiments did not allow of.

The production of the oil as a by-product in the manufacture of gas is relatively small compared with the possible demand for heating purposes, and the value may be expected to rise in consequence. At the present price of £2 a ton, the consumption required being half that of coal, a very small margin of profit is realized. But by continued experiments, improvements may be reasonably expected which will diminish the consumption of oil, and at the same time open the way to the employment of the natural oils and others distilled from schists, &c. At all events, since the economic conditions in France are somewhat different from those which prevail in England and America, it is important that the employment of oils for heating purposes should be fully studied in that country.

For most of the above facts we are indebted to *Le Journal de l'Eclairage au Gaz*.

Circular to Gas Companies.

A FIRST conviction under the City of London Gas Act, 1868, for supplying gas of inferior illuminating power and of less purity than prescribed by the Act, has taken place; but as an appeal to the next quarter sessions has been lodged against the jurisdiction of the Lord Mayor sitting as a justice of the peace for the City of London, the conviction must not be considered final, although we do not see much chance of its being quashed. The complainants in the case were the Mayor and Corporation of the City of London; but since it was felt that the Lord Mayor could not be both plaintiff and judge in his own case, the summons was amended by striking out the Mayor and Corporation, and making Mr. T. J. Nelson, their solicitor, the prosecutor on his own behalf. The Chartered Gas Company were the parties summoned; and as they still objected to the jurisdiction of the court, notwithstanding the amendment made in the summons, they withdrew from all defence, and allowed the conviction to be obtained on an *ex parte* statement of the case.

The deficiencies in illuminating power were reported by Mr. Young, the examiner, at the testing-station, 98, Leadenhall Street. They occurred on Dec. 3, 4, 6, 7, 8, and varied from half a candle to a candle and a half. The company appealed to the chief examiner, and raised a variety of objections (which will be found in detail in the report of the proceedings) against the apparatus as inaccurate, and also against the mode of conducting the experiments and calculating the results. All these objections are considered in the report of Dr. Letheby, who came to the conclusion that the inaccuracies—sometimes in favour of, and sometimes against the company—when set one against the other leave a balance of 1·5 per cent. in favour of the company. His report, therefore, confirms that of the local examiner.

The penalty imposed by the Act of 1868 is 20s. per 100,000 feet of gas made on the day the forfeit is incurred, for every half candle deficiency; and, after an inspection of the company's register by Mr. S. Hughes, the Corporation claimed penalties amounting in all to £218 16s. 2d. We must regard it as most unfortunate that the company should have been advised to keep back the register at the hearing, and withhold information it was in their power and was clearly their duty to give. The circumstance created a strong feeling against them, and the Lord Mayor commented with some severity on this suppression of evidence.

The excess of ammonia was reported by the examiner at the Gray's Inn Road testing-station. The referees have allowed 5 grains in 100 feet, and the reports of the examiner for Dec. 7, 8, 9, 10, and 11 show an excess of from 0·6 to 1·2 grains. Against these reports no appeal was made. The penalty imposed by the Act for excess of impurity is £50 per day; consequently the Corporation claimed £250.

The Lord Mayor reduced by one-half the penalty imposed by the Act for supplying gas of inferior illuminating power, and mitigated the fine for excess of impurity to £10 per diem. The City solicitor protested against this leniency, and contended that the Lord Mayor had no power under the Act to reduce the penalties. On this point he asked for a case to the Queen's Bench, but subsequently determined not to prosecute the appeal.

The objection taken by the company to the jurisdiction of the Lord Mayor may or may not be well founded; but even if valid, it was, in our opinion, indiscreet to have raised it. Reading, however, the Act of 1868 as one with the Act of 1860, the objection would appear untenable, as in the interpretation clause 4 of the latter Act it is enacted that the word "magistrate," in the City of London and liberties thereof, shall mean "any justice of "the peace for the City of London or liberties thereof;" and it is well known that the Lord Mayor and aldermen are the only justices acting in the City of London. The Act of 1868 is, by the 2nd section, directed to be read as one with the Act of 1860; and section 76 of the former gives a magistrate power to issue a distress warrant for the recovery of any penalties incurred.

We regard it as extremely unfortunate that any occasion for these proceedings should have been given; but since they have occurred, we may call attention to the extraordinary complications revealed. In the first place, there is a testing apparatus certified as correct, which is accused of being defective; there is a leakage in the connexions of the cubic foot measure, and a consequent inaccuracy in the measuring capacity of the meter; the clock, too, is slow, and therefore the duration of the experiment is prolonged. Beyond this, the City appears to be supplied by the Chartered Company with gas from three different sources. It was clearly the intention of the Act of 1868 that the separate testing-places should test gas from separate stations; but the supplies are so mixed up that the company appeal with confidence from the report of the examiner who ought to test the Curtain Road make, to the report of the examiner of the gas made in Horseferry Road. The several inaccuracies in the apparatus, and the mode of weighing the candles, as we have already said, nearly balance each other, so that there is but a small error in the final result; but we are still left in doubt as to what is the actual quality of the gas made at the Curtain Road station.

A very temperate and sensible article on these proceedings appeared in the *Evening Standard* of the 8th inst. The writer points out what we may call the special obligations the Chartered Company were under to observe the law. They were the first to acquiesce in it, and their engineer was one of those appointed to assist in carrying it out. From such a company an objection to the jurisdiction of the Lord Mayor comes with a very bad grace. "If the Lord Mayor cannot be trusted to adjudicate on a prose-"cution against a gas company, certainly the engineer of a gas "company cannot be the right person to administer a law designed "for the protection of the consumer. The Lord Mayor is quite "as likely as the engineer to act with impartiality, and the trust "should be mutual." These sentences, no doubt, will represent what is thought in the Corporation, and probably much of the animosity exhibited by the City authorities would be appeased if the engineer of the Chartered Company ceased to be one of the referees under the Act of 1868.

As regards the literal meaning of the gas Acts, there is yet another point which may deserve a moment's consideration. It may be reasonably asked, for example, whether the 25th section of the Act of 1860 does not make an absolute consumption of 5 feet of gas and 120 grains of sperm per hour necessary conditions for obtaining a conviction in cases of alleged deficiency of illuminating power. The instructions of the referees have indeed sanctioned the reduction of observations to the common standard, when the consumption of gas, or of candles, or of both, has varied from the prescribed standard. But we know that all such calculations, so far from neutralizing the effects of the differences, introduce serious errors. It is quite certain that the light given is not in direct proportion to the consumption in either case, and that the method usually adopted of reducing the consumption to statutory quantities is fallacious. Whether or not the paper of Professor Silliman, which we publish to-day, will assist us to a more correct

* The evaporating power of heavy oil compared with patent fuel was determined by M. Deville. The weight of water evaporated by 1 kilogramme of oil was 10·9 kilogrammes; and by 1 kilogramme of patent fuel, 7·9 kilogrammes. We have been informed that the patent fuel of the Aberdare Company was used. —ED. J. G. L.

method, is a point on which we shall at present express no opinion. The absolute truth of "Farmer's Theorem" will probably be disputed here, as it has been in America. The cardinal fact remains, however, that illuminating power is not in direct proportion to consumption, and consequently calculations made on the assumption that it is must involve error.

A paragraph, which we copy elsewhere from a local paper, gives some information as to the disastrous effects which have attended the course taken by the Maryport Town and Harbour Trustees, in carrying out their gas speculation under the guidance of Mr. Flintoff. The gas-works have, it is stated, cost £11,000 instead of £8000, at which they were estimated; and the public lamps are now said to cost £996 per annum instead of £300, for which they were lighted by the old company.

The misdeeds of gas companies, real or alleged, form so often the groundwork for proposals to transfer the supply of gas to municipal bodies, that it is of some importance to inquire how some corporations treat their customers when they have got the supply into their hands. Carlisle, just now, affords us an illustration, which, we trust, is exceptional. The Corporation own both gas and water works; and a resolution of the Gas Committee, which is now before us, authorizes *the cutting off of the gas from persons who have refused or neglected to pay for the water they have used!* This beats anything hitherto attempted by a gas company. To judge from the local papers, municipal affairs at Carlisle seem to be in considerable confusion—the Gas Committee appearing to do just as they please, without consulting the council. Among other arbitrary acts, on the part of this committee, was the dismissal of the gas manager, for some trifling irregularities which appear to have been fully explained; and a section of the public now agitate for his reinstatement. The citizens of Carlisle are, in fact, divided into "Porterites" and "Anti-Porterites;" just as, in former years, "Pike" and "No Pike" formed the rallying cry of the ratepayers of Liverpool, in regard to the supply of water.

A member of the Town Council of Southport, too, has been exhibiting a very illiberal spirit. Embarrassed at all times in their gas undertaking by their own want of enterprise, the recent accident to their gasholder and the exigencies of the season necessitated an increased expenditure in wages to keep up the supply of gas to the town. This extra expenditure afforded one member of the council the opportunity of asking some questions, which received perfectly satisfactory answers, and only served to show the carping spirit which dictated them.

The Lynn filibusters, wise in their generation, announce that 600 shares have been subscribed for in the town by 70 inhabitants, which will form a nest-egg for the payment of their expenses in the event of their failing to obtain their Act. The invitation to subscribe says that "the remunerative character of a gas business "is too well known to require comment. The investment of "capital in these undertakings, if properly managed, always bears "a high dividend, and even in spite of bad management is gene-"rally productive of profit." Upon this point we should recommend any one disposed to take shares to ask the shareholders in the Cambridge Consumers Gas Company what their experience has been. The Mayor of Lynn and three other local gentlemen of influence have joined the Board of the company formed for purchasing and carrying on the works of Mr. Malam, and most of the disposable shares have been taken up.

The award of the umpire in the matter of the Bromsgrove Gas-Works has been made, and amounts to £6400, or about midway between the valuations of the two valuers. The sale of the Reddich works has fallen through, and the undertaking therefore remains in the hands of the present owner, Mr. Clift.

Correspondence.

THE GASHOLDER ACCIDENT AT CAMBRIDGE.

SIR,—Respecting the information given in your issue of the 4th inst., of the accident to one of our gasholders, it is only justice to the parties whose duty it is to see to the pressure to say that the water was up only to the overflow, and that the holder was no less than 24½ inches in the water at the time of the accident; but to judge fully and fairly of the cause of the accident, it would be necessary to know the history of both the tank and the gasholder.

W. WOOD.

Cambridge Gaslight Company's Office, Jan. 14, 1870.

[Why does not the writer send us the history of the tank and gasholder?—ED. J. G. L.]

THE GAS COMPANIES AT CHEPSTOW.—Some few years ago many of the inhabitants became dissatisfied with the gas supplied by the company then in existence. A new gas consumers company was formed, and in due time a rival gas-work was opened. The new company, being determined to beat the old company out of the field, supplied gas at a much lower rate, and for a time it paid a moderate dividend. The new company now supplies gas at 4s. per 1000 cubic feet, but last year, as the shareholders only received 3 per cent. on their investment, which is of uncertain value, it is said they contemplate raising the price to 5s. per 1000 feet.

Legal Intelligence.

MANSION HOUSE POLICE COURT.—THURSDAY, JAN. 6.

(*Before the Right Hon. the* LORD MAYOR.)

THE MAYOR AND CORPORATION OF THE CITY OF LONDON *v.* THE GASLIGHT AND COKE COMPANY.

This was a case in which ten summonses had been taken out against the defendants, under the provisions of the City of London Gas Act, 1868, for supplying gas on certain days during the month of December last of deficient illuminating power, and of less purity than that prescribed by the Statute.

Mr. T. J. NELSON (the City solicitor) attended to prosecute, and the defendants were represented by Mr. HAWKINS, Q.C., and Mr. BESLEY.

On the case being called,

Mr. HAWKINS, addressing the Lord Mayor, inquired which summons he proposed to take first.

Mr. NELSON: If you will allow me to speak you will hear.

Mr. HAWKINS: Because I am just going to take an objection to these proceedings altogether. There is no one present who has greater confidence than I have in the tribunal before which I now appear, and no one would be more ready than myself to submit to your lordship's judgment; but I feel that I, as representing the company, should be placed in great difficulty if I were in any way to assent to a jurisdiction which I believe does not exist. This is a summons taken out by Mr. Nelson, the City solicitor, on behalf of the Corporation of London, of which corporation the Lord Mayor is the head; and upon a principle which is so well known that I need only hint at it, you, being the head of the corporation by whom these proceedings are taken, I submit, have no jurisdiction. I believe it is a well-known principle of law, that one cannot be judge in a case in which one has the smallest or slightest particle of interest. I may state that some few years ago, under another Act of Parliament, proceedings were taken against one of the gas companies by the Commissioners of Sewers, and the case came on before Alderman Sir John Musgrove, and he himself suggested on that occasion the very objection which I, on the part of the present defendants, take to-day—viz., that he, as one of the Commissioners of Sewers, had no power to act and no jurisdiction in the matter. There are other authorities which will be found in the books, but it will not be necessary that I should call attention to them. There is the case of *The Queen v. The Cheltenham Commissioners*, many years ago; and there is another case against the justices of Hertfordshire—*The Queen v. Ford*; and then I see in the year 1860 there is a case of *The Queen v. The Justices of Richmond*, where the same objection was taken. On that occasion, however, the objection was taken too late, because there had been a waiver of it; but it was held by the court that if it had not been waived the objection would have been fatal. Under these circumstances, therefore, I submit that your lordship has no jurisdiction.

Mr. NELSON: In answer to the preliminary objection of want of jurisdiction which the learned counsel has taken, I say, first of all, that in the City of London there are no other justices except the Lord Mayor and the Court of Aldermen; and if the objection to your lordship's jurisdiction is valid, it would equally apply to the other justices of the peace. But I think the objection is cured by the Statute itself, because the Act 23 & 24 Vict., c. 125, more commonly known as the Metropolis Gas Act, 1860, and which, by the Act under which these proceedings are taken, it is provided shall be taken together with it, expressly states (section 4): "The word 'magistrate' means any police or stipendiary magistrate acting in and for the district of the metropolis in which the matter referred to him arises, and in the City of London and the liberties thereof shall mean any justice of the peace for the City of London and the liberties thereof." Therefore, the Legislature having expressly said that where the word "magistrate" is used in the Act of 1868, it shall be any justice of the peace of the City of London, it must be taken to have made that law with the full knowledge that according to immemorial custom in the City of London the Lord Mayor and the Court of Aldermen are the justices. I think this expressly gives you jurisdiction, without reference to the special question which the learned counsel has raised.

Mr. OKE (chief clerk): In what way is the Lord Mayor interested?

Mr. HAWKINS: In this way. He is one of the prosecutors—he is a member of the corporation. These are summonses upon informations which are laid by the City solicitor on behalf of the corporation.

Mr. OKE: But as you appear you waive the objection.

Mr. HAWKINS: I only appear to raise the question of jurisdiction. I do not appear to answer the summonses.

Mr. OKE: A more recent Statute, which was passed after the question of the jurisdiction of the Commissioners of Sewers was raised, enacts that justices of the peace shall not be incapable of acting as justices on the trial of offences against their body.

Mr. HAWKINS: That is where the corporation themselves are not the prosecutors. There is no Act of Parliament which says that a prosecutor can try his own case.

Mr. OKE: But if the City solicitor, when applying for the summonses, had applied on behalf of Thomas James Nelson, your objection would not arise.

Mr. HAWKINS: What it would have done then I cannot say.

Mr. NELSON: My Lord Mayor, I will remove the learned counsel's objection by asking you to strike these words out.

Mr. HAWKINS: Then there is no information upon which I am summoned at the present moment.

Mr. OKE: I apprehend your appearance here is sufficient.

Mr. HAWKINS: No. I appear to object to the jurisdiction of the Lord Mayor to hear these summonses, and I appear only for that purpose. Unless I were personally here I could not object.

Mr. OKE: I apprehend it is competent for his lordship to strike out these words?

The LORD MAYOR: And the summonses would remain good when the words are struck out.

Mr. HAWKINS: Without having been served?

Mr. OKE: I apprehend they were served in the usual way.

Mr. HAWKINS: No. I am summoned here on a summons taken out on the part of the corporation, and I appear to object to that. If you amend that summons I must be served with it.

Mr. OKE: You cannot object that the corporation are not competent to summons you as a corporation.

Mr. NELSON: At all events I ask your lordship to amend the summons by striking out the words "on behalf of the Corporation of London."

Mr. OKE: The information has been laid by them.

The LORD MAYOR: If the magistrates as members of the corporation are not qualified to try this question, is there any provision in the City Gas Act to appeal to any other tribunal?

Mr. NELSON: None whatever.

The LORD MAYOR: Then there is no penalty?

Mr. NELSON: No.

Mr. HAWKINS: Permit me to say that if there are defects in the Act of Parliament the sin must be visited upon the corporation themselves. They prepared the bill, which was a most stringent one, and a most cruel one upon the gas companies. We are not responsible for the defects in it.

Mr. NELSON: If yours is a good objection, it has been going on for 800 years. There is not a single case in which the corporation are interested as owners of property in which they would be able to appear as prosecutors if this objection

is held good, therefore I shall take the whole responsibility of asking his lordship to amend the summons.

The LORD MAYOR: I shall amend the summons unquestionably.

Mr. NELSON: Then, my lord, I appear before you for the purpose of prosecuting ten summonses which have been taken out against the Gaslight and Coke Company, better known by their popular title of the Chartered Gas Company. Five of these summonses are in respect to deficiency of illuminating power, and five in respect of impurity of the gas supplied by the defendants to the City of London in the early part of the month of December last; and the penalties which I shall ask your lordship to inflict are in respect of the deficient illuminating power, £218 16s. 2d., and in respect of the impurity of the gas, £250.

Mr. HAWKINS: Perhaps it may be convenient if I call attention to one point, and that I should distinctly inform your lordship of the position in which I now appear. I do not now appear in answer to these summonses, because I protest against your lordship's jurisdiction. Therefore my sitting here must not be taken to be an appearance; I am here simply as one of the public, listening.

Mr. NELSON: Then my course will be much more simple, having no respondents. But I must prove the service of the summons. I am sorry that the learned counsel thought proper to interrupt. He has appeared, and in consequence of his objection——

Mr. HAWKINS: I beg your pardon; I must not be misunderstood, and I will not be. I appear here not to answer the summonses, but to object to their being heard at all. I do not appear to answer the summonses. I do not admit the service of the summonses, and it must not be supposed that I do.

Mr. OKE: Being here to object to the jurisdiction, you must admit the service of the summonses.

Mr. HAWKINS: It does not in the least degree follow. I am here simply to object.

Mr. NELSON: I will go on with my opening statement, notwithstanding the interruption. It will be convenient that I should deal with the summonses for deficiency of illuminating power by themselves, and afterwards deal with those relating to impurity. It was necessary, in order to avoid any objections, that a separate summons should be taken out for each separate offence, but, inasmuch as the proofs will be all the same, I propose to deal with them together. I ask your lordship's forbearance for a few moments while I just state the circumstances under which we come before you to-day. Up to the year 1860, I believe the whole of the gas companies of the metropolis had been regulated only by the private Acts of Parliament of the several companies supplying the districts respectively. But previous to that period there had been many complaints on the part of the public in consequence of the deficiency of existing legislation to protect their interests in this matter, and these complaints led to an Act of Parliament being passed in the session of 1860, which is the Act I have already referred to—viz., the 23 & 24 Vict., c. 125—and which for the first time established a code of laws binding upon the entire metropolis, including in that the City of London. By the provisions of that Act certain penalties were imposed upon the gas companies in case of any deficiency in the purity or illuminating power of the gas supplied by them as prescribed therein. I think I may broadly state that those penalties were never in any case enforced against the companies, although an attempt was made upon one occasion by the Commissioners of Sewers to do so, in consequence of the repeated complaints made against one of the companies. But a technical objection was then, as now, taken by the company, I believe, there being no answer to the complaint on the merits of the case. It was, however, held that as, according to the terms of the Act of Parliament, only a consumer could lay an information against the company, and the clerk to the commissioners not being a consumer the prosecution must fail. I need hardly say that the failure of that prosecution led to increased dissatisfaction against the companies, and in three successive sessions of Parliament—viz., in 1866, 1867, and 1868—committees of the House of Commons sat to inquire into the operations of these companies, with a view of amending the Act of 1860, so far as it was possible to do so in the face of the determined opposition of the companies themselves. Those inquiries culminated in the passing of a new Act in the year 1868, the operations of which are limited to the City of London, and so much of the district of the Chartered Gas Company as is in the county of Middlesex. It is under this Act of Parliament that the summonses are laid upon which you are called to adjudicate this day. This Act provides an entirely new machinery, and gives what the Legislature hoped was a very simple process for enforcing upon the gas companies their obligations to the public. Instead of prescribing or endeavouring to prescribe by Act of Parliament a code of laws for the guidance of the companies, a new tribunal was called into existence in the appointment of gas referees, whose duty it is to prescribe the places where the gas is to be tested for purity and illuminating power, and the times and periods when those tests shall be made. It appoints, further, another staff of officers, called "gas examiners," who are required daily to be in attendance at the testing-places, to test the gas and record the results of their experiments, and to furnish to the corporation on the one hand and to the companies on the other, as also to the chief gas examiner, a statement of those results. These provisions are made in order that neither the gas companies nor the public shall be unfairly dealt with. A chief gas examiner is also appointed, to whom an appeal lies from the reports of the gas examiners, and then the Act goes on to prescribe that penalties are to be enforced before a magistrate on the reports of the gas examiners if unappealed from, or if appealed from, then upon the report of the chief gas examiner. The penalties as they were fixed by the Act of 1860 were altered by the Act of 1868, so far as the illuminating power of the gas is concerned, and instead of being a definite sum, it is to be "the value of the defective power;" so that the gas company being under obligation to supply gas of a certain illuminating power, if it is found not to reach that standard, they are liable to such a penalty as would curtail the profits they would derive from that defective power. As to impurity, the penalty was left as it was under the old Act—viz., a fixed penalty of £50. The chief clerk reminds me of what I should have stated a little further on, that the chief gas examiner has the power, if he thinks the defect of illuminating power or excess of impurity was occasioned by an unavoidable cause or accident, to certify to that effect, so as to relieve the company from the penalty they would otherwise have incurred. The authority to whom the duty of appointing the gas referees is entrusted is the Board of Trade, and I may state that the Board of Trade did proceed to appoint three gentlemen to act in that capacity. And, certainly, I am bound to say, that the appointment which they thought right to make under the Act of Parliament places me in some little difficulty in conducting this case; for, notwithstanding the Act is clear and explicit that they shall "appoint three competent and impartial persons," one of the gentlemen fixed upon by them to see that the gas companies performed their obligations is the chief engineer of the company who are the defendants here to-day. So that, instead of having an impartial public officer to call before your lordship, it may be necessary to call one of the officers of the company to prove that his employers have committed this offence. But this being the state of things, the gas referees, in pursuance of the directions given to them, have issued the necessary instructions for the testing of the gas, and have appointed certain testing-places. Among the testing-places so appointed for the Chartered Gas Company is the testing-place, No. 98, Leadenhall Street, in the City of London; and it is with respect to the gas tested there on the 3rd, 4th, 6th, 7th, and 8th of December last, that I ask your lordship to impose upon the Chartered Company the penalties they have incurred for deficiency of illuminating power. I do not state this with a view to prejudice your lordship's mind in any way, and if I did I am sure it would not have any effect, but I am bound to say that the Corporation of London have exercised very considerable forbearance in dealing with the Chartered Gas Company. They have known that they were erecting very large works down the river, near Barking, for the purpose of giving a better supply to the City of London and the metropolis generally throughout their district, and they have overlooked for some considerable time the defects which were patent upon the returns of the gas examiners, both as regards the illuminating power and the purity of the gas. But at length the defects became so bad that they felt that they would not be discharging their duty to the public if they did not call upon the company to answer for their default. On the 3rd of December last the gas supplied, instead of being of the standard which until the 1st of January of this year it was required by the Act of Parliament to be—viz, 14 candles—had only an illuminating power of a trifle over 13 candles—13·1—so that it was nearly one whole candle below the standard. On the following day, the 4th of December, it only reached 12·6, being nearly a candle and a half deficient; on the 6th of December it was 13·1, or nearly a whole candle deficient; on the 7th of December it was 13·5, or half a candle deficient; and on the 8th of December it was 13·3, or nearly three-quarters of a candle deficient. Now, my Lord Mayor, these being reports made in pursuance of the Act of Parliament to the corporation, under the terms of the 50th section, it was necessary, before taking any proceedings, that they should see whether the gas company exercised the right of appeal, which, under the 51st section, was provided for them. That section enacts that "if the company think themselves aggrieved by any report of a gas examiner, they may, within seven days after the day to which the report relates, appeal to the chief gas examiner, whose decision (after hearing the parties) shall be final and conclusive, and the chief gas examiner shall report every such decision to the corporation." Then the next section says that "if, in any case, the company do not appeal as aforesaid, the report of the gas examiner shall be final and conclusive." In this case the gas company thought right to appeal to the chief gas examiner, Dr. Letheby, and I have here his report upon the appeal made to him. I do not intend to trouble your lordship by reading this long report, I will simply hand it in, unless the learned counsel who appears for the company desires to hear it read.

Mr. HAWKINS: I do not.

The LORD MAYOR: The learned counsel says he does not.

Mr. HAWKINS: It is only intended to trap me into something like an admission that I am here representing the company.

Mr. NELSON: The idea of my entrapping Mr. Hawkins, or of being so weak as to attempt it!

The following report was then handed to the bench:—

To the Right Hon. the Lord Mayor, Aldermen, and Common Council of the City of London.

IN THE MATTER OF THE GASLIGHT AND COKE COMPANY.

My Lord and Gentlemen,—I have to report to you that the Gaslight and Coke Company appealed to me on the 10th inst., and requested me to inquire into the correctness of the gas examiner's returns of the deficiency of illuminating power of the gas supplied to the testing-place at 98, Leadenhall Street. The secretary of the company states in his letter to me of the 10th inst., that "the great proportion of the gas supplied from the Curtain Road station (to Leadenhall Street) has been manufactured at and pumped from the Westminster station, where it has been tested and found to be usually about 16 candles. The same gas, as tested at Arundel Street, is always reported as being well above the parliamentary standard. On reaching the Curtain Road gasholders it has been again tested, and found uniformly to be equal to about 15¼candles, but in being discharged into the City mains it is always improved by the large admixture of Boghead or or Lesmahago cannel (10 per cent.) which is used in manufacture at that station, and which should make its illuminating power certainly not less than 16 candles. The directors are therefore of opinion that there must be something faulty in the photometrical apparatus in use at Leadenhall Street, or that some mistake in calculation must have been made in compiling the returns." In a subsequent letter of the 17th inst., the secretary requests me to have "the meter in use at the office in Leadenhall Street tested, and all the other apparatus thoroughly examined."

I therefore proceeded to make a careful and circumstantial inquiry into the whole matter, and was informed by Mr. Upward, the superintendent of the company, who was present at the inquiry, that the chief objections to the apparatus and mode of testings were as follows:—

1. That the cubic foot measure and its connexions with the meter were defective.
2. That therefore the measuring capacity of the meter was inaccurate.
3. That the delivery of the gas to the photometrical burner was improperly regulated.
4. That on one occasion he had to complain to the gas examiner of the dirty state of the glass upon the photometrical burner.
5. That the method of weighing the candle was liable to error; and
6. That the calculations of experimental results were, perhaps, inaccurate.

In fine, the objections had reference not merely to the manipulative skill of the operator, but to almost every part of the photometrical apparatus which the gas referees had so recently provided and certified as being correct. It has been my duty, therefore, to investigate the whole of these objections, and I have been assisted in my inquiries by your principal gas examiner, Mr. Heisch, by the superintendent of the company, Mr. Upward, and by the gas engineer, Mr. Sugg, who constructed and fitted the apparatus. I had also made arrangements for the assistance of Mr. Sporne, the corporation tester of gas-meters, if his advice was necessary. The results of my investigations are as follows:—

As to the statement of the secretary, that the gas at Leadenhall Street is substantially the same as that at Arundel Street, and the opinion of Mr. Upward that it is not essentially different from that at Gray's Inn Road, I find on reference to the daily returns of the gas examiners that there is no similarity whatever in the quality of the gas at the three places, for, to take the daily testings of illuminating power and chemical quality on the several days in question of the present month, the returns of the gas examiners are as follows:—

Date.	Illuminating Power in Standard Sperm Candles.			Grains of Ammonia per 100 Cubic Feet of Gas.			Grains of Sulphur per 100 Cubic Feet of Gas.		
Dec., 1869.	Leadenhall Street.	Arundel Street.	Gray's Inn Road.	Leadenhall Street.	Arundel Street.	Gray's Inn Road.	Leadenhall Street.	Arundel Street.	Gray's Inn Road.
1	13·9	14·9	15·1	2·5	2·2	6·1	21·9	32·9	22·9
2	13·9	14·6	15·4	2·5	1·8	5·3	21·6	34·8	20·1
3	13·1	14·2	15·0	2·1	1·6	4·4	22·0	34·6	..
4	12·6	14·2	15·2	2·1	1·6	4·5	22·0	35·4	19·5
6	13·1	14·5	16·1	..	..	..	..	..	..
7	13·5	15·0	15·3	2·3	1·9	5·6	20·6	26·1	23·7
8	13·3	14·3	16·0	2·2	1·7	6·0	23·1	18·8	24·6
Mean	13·4	14·53	15·44	2·28	1·80	5·32	21·87	30·43	22·16

And I may remark that, although I have taken but seven days by way of illustration, the returns are at all times indicative of a substantial difference in the quality of the gas at the three places.

2. With regard to the defective state of the cubic foot measure and its connexions with the meter, I have ascertained that there is a leakage to the extent of 27·55 cubic inches, or the ·0159 of a cubic foot, in the measurement of a cubic foot into the meter. This is at the rate of 1·59 per cent., and it would, if it had existed during the seven days alluded to, have diminished the illuminating power of the gas to the average extent of ·21 of a candle. But I am informed by Mr. Heisch that there has really been no such deficiency in the capacity of the meter, for, having ascertained by repeated examinations that the water-line marked upon the glass of the meter is correct for a cubic foot, he has taken care to keep the water in the meter at that level. Besides which the gas examiner, Mr. Young, is very positive in his statement that when he last tested the meter on Saturday, the 11th inst., there was no leakage in the fittings, for he examined them in the usual manner by means of the pressure-gauge upon the outlet of the cubic foot measure. On the other hand, I have ascertained by careful experiment since the fittings have been made tight, that the meter is a little overcharged with water, and that its measuring capacity is 3·83 per cent. short of a cubic foot. But I have also discovered that the minute clock which is attached to the meter is slow to the extent of 17 seconds during the photometrical observations of 10 minutes. This is at the rate of 2·83 per cent. against the error of the meter (3·83), and it leaves an error of 1 per cent. against the photometrical power of the gas, thereby lowering it to the extent of ·13 of a candle.

3. As to the regulation of the supply of gas to the burner, it was objected by Mr. Upward that it was not effected by means of the cone at the bottom of the burner, but by the fine adjustment provided by the referee. I have, however, ascertained by careful experiments that when the burner is consuming gas at the rate of 5 feet an hour, it does not matter in the least degree whether the supply is regulated by the tap of the main-pipe, or by the weights of the governor, or by the fine adjustment, or by the cone of the burner, and these results are confirmed by the opinion of Mr. Sugg, who is the inventor and maker of the instrument.

4. With respect to the dirty state of the glass upon the burner, I have not been able to obtain the precise date of its occurrence, although it seems to have happened but on one occasion. It is a very proper complaint, for it is the duty of the gas examiner to clean the glass of the burner every evening before he commences his experiments.

5. The method of balancing and weighing the candles is undoubtedly faulty, for as the lighted candles are placed in the scale immediately under the end of the beam, and are kept burning for at least ten minutes before they are balanced, the beam becomes hot, and is so far elongated as to make a difference of rather more than a grain in the true weight of the candles. This is added to the weight of the candles after the lapse of ten minutes, when they are returned to the scale and weighed. The consumption of the candles, therefore, will appear to be at least 6 grains per hour more than the truth, and this will increase the illuminating power of the gas about 2·5 per cent., making 14-candle gas appear as 14·35.

6. With regard to the calculations of the experimental results, I have ascertained from the books that although the gas examiner does not use the unnecessarily laborious process of calculation prescribed by the referees, yet the results are accurate, and are strictly in accordance with the rules of the referees.

It appears, therefore, on reviewing the facts of this inquiry, that although there are several sources of error, yet they are so nearly balanced as to make but little, if any, difference in the final results, for if on one side there is a deficiency in the measuring capacity of the meter to the extent of 3·83 per cent., which would be against the photometrical power of the gas, there is on the other side an excess of power to the extent of 5·33 per cent. in the method of weighing the candles, and in the slowness of the minute clock.

Taking all these facts into consideration, I am of opinion that there was a deficiency in the illuminating power of the gas supplied to the testing-station at 98, Leadenhall Street, by the Gaslight and Coke Company, on the 3rd, 4th, 6th, 7th, and 8th of the present month of December, and that the deficiency is expressed in the daily returns of the gas examiner as follows:—

Dec. 3	13·1	standard sperm candles.	
„ 4	12·6	„	„
„ 6	13·1	„	„
„ 7	13·5	„	„
„ 8	13·3	„	„
Average	13·12	„	„

I have further to report that the deficiency of illuminating power was not occasioned by an unavoidable cause or accident.—I remain, your obedient servant,

HY. LETHEBY, M.B., M.A., &c.,
Chief Gas Examiner for the City of London.

17, *Sussex Place, Regent's Park, Dec.* 23, 1869.

Mr. NELSON: Well, my lord, under the terms of the 76th section of the Act of Parliament that report of the chief gas examiner is directed to be conclusive evidence of the liability of the company to forfeiture. It only remains, therefore, for me to deal with the amount of the penalties which I say the company have incurred, under the 73rd section, in respect of these days. The words of the section are—"If on any day the gas supplied by a company from any station is of less illuminating power than it ought to be under this Act, the company shall forfeit a sum equal to the value of the defective power, estimated at the rate of 20s. for every half candle of defective power on every 100,000 cubic feet or any fractional part less than 100,000 cubic feet of gas, whether cannel or common respectively, made at that station on the day of default." Now, my Lord Mayor, under the 72nd section the company are bound to keep a register of all the gas made by them at each station on each day, and to afford access thereto at all reasonable times to the corporation and their respective agents. We asked to have an inspection of that register, which they accorded to us as they were in duty bound to do, and we have thus ascertained the quantities of gas which have been made at the several stations of Brick Lane and Curtain Road. But here the matter becomes a little complicated, from the fact that the station at Brick Lane largely assists the Curtain Road station in the supply of gas to the City, and it seems that neither of these works on the boundary of the City are of themselves sufficiently large for the supply of the City, and, therefore, the company, some time ago, laid down a connecting-main between their principal station in the Horseferry Road and the Brick Lane and Curtain Road stations. But their books contain a record of the quantities of gas received from the Horseferry Road station at Brick Lane, and of the quantity received at the Curtain Road from Brick Lane; and though perhaps I might, as these stations are all connected together, if I had desired to be hard upon the company, have contended that the whole of the gas made at the three stations was liable to be affected by these proceedings, I think the justice of the case will be met by imposing a penalty in respect of the two stations only which directly contribute to the supply of the City. At the Curtain Road there is scarcely any gas at all made; nearly all the gas sent from there is supplied to it from Brick Lane; in point of fact, the Curtain Road station is merely a conduit through which the gas passes. I have availed myself of the services of Mr. Hughes, who is a well-known gas engineer, to take out the quantities of gas made at these two stations on these days, and to calculate the penalties incurred under the Act of Parliament. I have here a table which is a calculation of the penalties so incurred, of which I could hand a copy to the representative of the gas company if there were one present. As it is, I can only hand it to your lordship. It gives, as your lordship sees, a total of £218 16s. 2d., which is the sum I shall ask your lordship to issue your distress-warrant for, pursuant to the provisions of the 72nd section of the Act.

The following evidence was then called:—

Mr. *Wilson Lyons:* I am a clerk in the office of the Board of Trade. I produce the original appointment, by the Right Hon. John Bright, as President of the Board of Trade, dated the 1st of September, 1869, of John Sampson Peirce, Frederick John Evans, and Robert Hogarth Patterson, as gas referees for one year. I also produce the original appointment of Dr. Letheby, as chief gas examiner, by the Duke of Richmond, on the 1st of September, 1868.

Mr. *Trotman Foster:* I am the secretary to the gas referees. I produce the original certificate of instructions for the gas examiners, made by them in pursuance of the provisions of the Act, dated the 30th of September, 1869.

Mr. NELSON: The only part of these instructions with which I propose to trouble your lordship is the second paragraph, which relates to the testing-places. "The testing-places shall be as follows:—For the City of London Gaslight and Coke Company, at 106, Cannon Street; for the Great Central Gas Consumers Company, at 7, Friendly Place, Bancroft Road, Mile End; and for the Gaslight and Coke Company, at 17, Arundel Street, Haymarket, 98, Leadenhall Street, and 43, Gray's Inn Lane." The two latter are for the eastern division of their district.

Mr. *Frederick Littell:* I am a clerk in the office of the town-clerk. I produce the original report from the Special Gas Committee of the corporation, dated the 5th of November, 1869, recommending the appointment of Mr. James Prince Fewtrell, Mr. William Charles Young, and others, to be gas examiners for the City of London. I have here also the minutes of the Court of Common Council of the 18th of November, confirming that report, and appointing those gentlemen. I produce the reports made to the town-clerk, in pursuance of the Act, of the testings by Mr. W. C. Young on the 3rd, 4th, 6th, 7th, and 8th of December, 1869, of the gas supplied by the Chartered Company.

Mr. FREDERICK WOODTHORPE (town-clerk): These are the original documents.

Mr. *W. C. Young:* I am one of the gas examiners for the City of London. The reports produced are the originals sent by me to the corporation. The gas is tested by me daily, as prescribed by the gas referees.

	Mean Lighting Power in Candles, Corrected.	Sulphur in 100 Cubic Feet of Gas, in Grains.	Sulphuretted Hydrogen.	Ammonia in 100 Cubic Feet of Gas, in Grains.
Dec. 3	13·1	21·6	None	2·05
„ 4	12·6	22·0	„	2·06
„ 6	13·1	22·0	„	—
„ 7	13·5	—	„	2·28
„ 8	13·3	20·6	„	2·2

Dr. *Letheby:* I am the chief gas examiner for the City of London. I have here the notice of appeal made to me by the Chartered Gas Company in respect to these five days.

The following correspondence was put in:—

Chartered Gas Company, Horseferry Road, Westminster, S.W., Dec. 10, 1869.

Dear Sir,—The directors have been very much struck with the recent reports of the illuminating power of the gas supplied by this company from their Curtain Road station, as tested at 98, Leadenhall Street, from which it would appear that of late it has been frequently and seriously below the standard authorized by the City of London Gas Act, 1868.

They have instructed me to acquaint you that for some time past the great proportion of the gas supplied from the Curtain Road station has been manufactured at and pumped from the Westminster station, where it has been tested and found to be usually about 16 candles. The same gas, as tested at Arundel Street, has been always reported as being well above the parliamentary standard. On reaching the Curtain Road gasholders it has been again tested, and found uniformly to be equal to about 15 candles; but, in being discharged into the City mains, it is always improved by the large admixture of Boghead or Lesmahago cannel (10 per cent.) which is used in manufacture at that station, and which should make its illuminating power certainly not less than 16 candles. The directors are therefore of opinion that there must be something faulty in the photometrical apparatus in use at Leadenhall Street, or that some mistake in calculation must have been made in compiling the returns.

Under these circumstances I am to request that you will be so good as to institute an inquiry as to the conditions under which the gas is tested, as the impression of the directors and of their officers is that they are supplying gas of at least 15-candle illuminating power.—I am, &c.,

J. O. PHILLIPS, Secretary.

Hy. Letheby, Esq., M.D., 17, Sussex Place, Regent's Park.

Chartered Gas Company, 146, Goswell Street, E.C., Dec. 16, 1869.

Dear Sir,—When I had the pleasure of meeting you on Tuesday last, at 98, Leadenhall Street, it was agreed that I should write to you on the subject of the gas testings at that station. In addition to the remarks I then made, I wish to inform you that there is a defect in the cubic foot measure. I do not know to what extent, but I believe Mr. Young has written to Mr. Sugg about it.

I feel quite convinced that there is some error in the testings at that station, as last night again there was a considerable difference between the testings made at the Curtain Road station and those taken at No. 98, Leadenhall Street.—I am, &c.,

A. UPWARD.

Dr. H. Letheby.

Chartered Gas Company, Horseferry Road, Westminster, Dec. 17, 1869.

Dear Sir,—In consequence of the representations of the superintendent, I am instructed by the directors to inquire whether you object to having the meter in use at the office in Leadenhall Street tested, and all the other apparatus thoroughly examined.—Yours, &c.,

J. O. PHILLIPS, Secretary.

H. Letheby, Esq., M.D.

17, *Sussex Place, Regent's Park, Dec.* 18, 1869.

Dear Sir,—I have received your letter of yesterday's date, and have already made arrangements for having the meter and the cubic foot measure at 98, Leadenhall Street tested. I shall be there on Monday, at four o'clock, and have so written to Mr. Upward. I will take care to satisfy myself very completely on the whole subject before I report to the corporation.—Truly yours,

HY. LETHEBY.

J. O. Phillips, Esq.

Mr. NELSON: I do not know that this is an express appeal in terms of the Act, but it does not matter, because if there is an appeal from the certificates already put in, Dr. Letheby's certificate is conclusive evidence. Dr. Letheby, will you be good enough to look at this report (the one already quoted)? Is that your original report made to the corporation, as directed by the Act of 1868, as the result of your investigation of this appeal?

Witness: It is.

Mr. NELSON: It is unnecessary for me to read it again; I read it in my opening speech.

The LORD MAYOR: You have examined these reports, and are prepared to prove that this was the illuminating power of the gas on the days mentioned?

Witness: So far as the inquiry has led me to it.

The LORD MAYOR (to Mr. Young): There are five days in which you state that the illuminating power was deficient?

Mr. *Young:* Yes.

The LORD MAYOR: Are you prepared upon oath to say that these were the reports you made, and that you believe there was that deficiency of illuminating power in the gas of the Chartered Company?

Mr. *Young:* Yes.

Mr. *J. O. Phillips*, the secretary of the Chartered Gas Company, was then called by Mr. NELSON to produce the "Register of Gas made," as required by the 72nd section of the Act of 1868. He said he believed it was in court.

Mr. HAWKINS made some observations to witness, to which Mr. NELSON objected.

Mr. HAWKINS: I have a right to advise him, and I advise him if he has got it to keep it in his pocket.

The register was not produced, and some conversation ensued upon the subject, Mr. Nelson pointing out that the company were liable to a penalty of £50 for default. Mr. Trewby, the superintendent of the Westminster station, and also the company's messenger, were called and examined, but no information was obtained from them. Kirby, the summoning officer, proved the service of the notice to produce, and, in the absence of the original, Mr. Nelson proposed to give secondary evidence of the contents of the register, so far as it bore upon the case.

Mr. *Samuel Hughes*, examined by Mr. NELSON, said: I am a gas engineer, of Park Street, Westminster, and have had considerable experience in all matters relating to the manufacture of gas. I attended at the Horseferry Road station of the Chartered Company about the 17th of December last, and saw Mr. Phillips, the secretary. He produced to me the register of the gas made daily at each of the stations. I extracted from the register the quantity of gas made by the company at the Brick Lane station on the 3rd of that month. It was 2,110,000 cubic feet, which expressed in units is 21·10 of 100,000 cubic feet. On the same day the gas made at the Curtain Road station was 4·50, expressing the quantity in units of 100,000 cubic feet.

Mr. NELSON: Does the "gas made" at Brick Lane station include what is received there into the gasholders from Westminster?

Witness: No; I do not understand it to be so. The quantities I give are the actual quantities manufactured at Brick Lane and Curtain Road.

Mr. NELSON: Did it appear, from the register you saw, that the gas at the Brick Lane station was transmitted to the Curtain Road station?

Witness: Quite so. The two are connected together, and the City is supplied with the mixed gas manufactured at the two stations.

Mr. NELSON: Now, asking the same questions with respect to the 4th of December, what was the quantity of gas made at the two stations?

Witness: At Brick Lane 20·23, and Curtain Road 4·50; on the 6th, at Brick Lane 18·04, and Curtain Road 4·58; on the 7th, at Curtain Road 4·57, and Brick Lane 21·60; and on the 8th, at Curtain Road 4·55, and Brick Lane 21·60, in units of 100,000 cubic feet.

Mr. NELSON: Have you in your hands a copy of the paper which his lordship has?

Witness: Yes.

Mr. NELSON: And does that give correctly the totals at the two stations, in the last column but one?

Witness: Yes.

Mr. NELSON: And are the penalties you have calculated under the 72nd section of the Act accurately calculated?

Witness: They are.

CALCULATION OF PENALTIES *incurred by the Gaslight and Coke Company under the 73rd Section of the City of London Gas Act, 1868, for Defective Power of Gas made at Curtain Road and Brick Lane Stations:—*

Date, 1869.	Illuminating Power in Candles.	Deficiency below 14 Candles.	Quantity in Units of 100,000 Cubic Feet.			Penalty at the Rate of 20s. for each Half Candle per 100,000 Cubic Feet.
			Made at Curtain Road.	Made at Brick Lane.	Total Quantity of Mixed Gas.	
						£ s. d.
December 3	13·1	0·9	4·50	21·10	25·60	46 1 7
„ 4	12·6	1·4	4·50	20·23	24·73	69 4 10
„ 6	13·1	0·9	4·58	18·04	22·62	40 14 3
„ 7	13·5	0·5	4·57	21·60	26·17	26 3 4
„ 8	13·3	0·7	4·55	21·60	26·15	36 12 2
						£218 16 2

14, *Park Street, Westminster, Jan. 6, 1870.* S. HUGHES.

Mr. NELSON: My Lord Mayor, that is the case for the prosecution.

The LORD MAYOR (after consulting with Mr. Oke): I shall proceed upon the advice I have received, which I believe to be sound and wholesome, and I shall assess the penalties as follows:—For the 3rd of December at £23 0s. 9d.; on the 4th of December at £34 12s. 5d.; on the 6th of December at £20 7s. 1d.; on the 7th of December at £13 1s. 8d.; and on the 8th of December at £18 6s. 1d.; making a total penalty of £109 8s., for deficiency of illuminating power.

Mr. NELSON: My Lord Mayor, I shall have to ask your lordship to be good enough to grant me a case—with all due deference—as to your power to mitigate these penalties, as it is a case of great importance to the citizens. I am not here to say what was the intention of the Legislature; I can only deal with the matter within the four corners of the Statute.

The LORD MAYOR: And I can only deal with this question in the ordinary way. I believe the law generally gives the magistrate power to mitigate, and in the exercise of that power, and with a desire to do right, and to administer impartial justice between all parties, I assess the penalties at £109 8s. instead of £218 16s. 2d.

Mr. NELSON: I have also to ask your lordship to condemn the company in the costs of these proceedings. Of course we are put to very serious expenses in bringing all these parties here.

Mr. OKE: We do not usually grant costs in these cases.

The LORD MAYOR: I am quite disposed to grant the solicitor's costs against the company, because I do not think they have dealt candidly in the matter. They should have come here and let one see the whole case. But I shall not hand the company over to the tender mercies of an Act of Parliament.

Mr. NELSON: They are not costs of mine. I am asking for the costs incurred in bringing professional witnesses here, and I think those costs ought to be paid by the company.

The LORD MAYOR: I will give you costs not exceeding £15.

Mr. NELSON: Now I have to trouble your lordship with the other case—as to the impurity of the gas. The company are summoned for supplying, on the 7th, 8th, 9th, and 10th of December last, gas from the Brick Lane station to the City of London, of less purity than it ought to have been under the City of London Gas Act, 1868, for which they are liable to forfeit the sum of £50, as prescribed by section 74 of the said Act. Under the old law—the Act of 1860—there was a definition of what the limits of the impurity were to be; but under the Act of 1868 it is left to the referees to fix the amount of impurity to be allowed. As to the sulphur, I am sorry to say they have not fixed any limits to that impurity at all, and therefore the public are actually now being supplied with gas more highly impregnated with sulphur than under the old Act. But as to the ammonia, the referees have, by the last section but three in their printed instructions for the use of the gas examiners, laid down this rule—"The gas shall be considered to be impure, rendering the company which issues it liable to the penalties described in the Act, when it contains more than 5 grains of ammonia in each 100 cubic feet, or when it shows the least trace of sulphuretted hydrogen." Now, my Lord Mayor, on the days charged in the summonses the gas exceeded the amount of impurity allowed, in respect of ammonia, as tested at the Gray's Inn Lane testing-place. On the 7th the quantity of ammonia in 100 cubic feet was 5·6 grains: on the 8th it was 6·0 grains; on the 9th it was 6·2; on the 10th it was 5·7; and on the 11th it was 5·6 grains. It appears also, from the report of Mr. Fewtrell, that on the 11th the quantity of sulphur present was not less than 29·3 grains, being nearly 50 per cent. more than was allowed under the old law. The reports of Mr. Fewtrell are not appealed from, and therefore I shall ask your lordship, under the 74th section of the Act, to impose a penalty of £50 for each one of those days.

Mr. *Lyons* was recalled to give formal proof of the appointment of the referees.

Mr. *Foster* produced a printed copy of the instructions issued by the referees to the gas examiners as to the tests for ammonia, and proved that No. 43, Gray's Inn Lane, was a duly certified testing-place.

Mr. *Littell* produced the minute of appointment of Mr. Fewtrell as one of the gas examiners for the City, and the report of the Special Gas Committee to the corporation recommending that appointment.

Mr. *Woodthorpe* produced the original reports made by Mr. Fewtrell to the corporation, of the results of his testings on the days in question.

Mr. *J. P. Fewtrell* was called, and deposed: I am one of the gas examiners of the City of London. I duly tested the gas of the Chartered Company on the 7th, 8th, 9th, 10th, and 11th of December, in accordance with the instructions of the referees. The reports produced are my original reports, and they are true.

	Mean Lighting Power in Candles, Corrected.	Sulphur in 100 Cubic Feet of Gas, in Grains.	Sulphuretted Hydrogen.	Ammonia in 100 Cubic Feet of Gas, in Grains.
Dec. 7 . .	15·3 ..	6·7 23·7	.. —	.. 5·6
Dec. 8 . .	16·0 ..	7·8 24·6	.. —	.. 6·0
Dec. 9 . .	15·7 ..	8·9	.. —	.. 6·2
„ 10 . .	16·2 ..	Gas extinguished by water in pipes	.. —	.. 5·7
„ 11 . .	16·0 ..	9·10 29·3	.. —	.. 5·6

Mr. NELSON: Under the 76th section, these reports are to be conclusive evidence. I can call the chief gas examiner to show that they have been sent to the company according to law.

Mr. *C. Hetsch* called: I am one of the gas examiners of the City of London. I posted duplicates of the reports, signed by Mr. Fewtrell, to the Chartered Gas Company.

Mr. NELSON: That is the case, my Lord Mayor. The penalties are fixed by the Statute, but I do not dispute your lordship's authority to mitigate in this instance.

The LORD MAYOR: You claim for penalties in five cases?

Mr. NELSON: Yes, £250. Perhaps, as Dr. Letheby is here, I had better prove that there has been no appeal.

Dr. *Letheby* recalled: There has been no appeal made to me by the Chartered Gas Company with respect to these reports.

Mr. NELSON: By the Act of Parliament they are required to appeal within five days.

The LORD MAYOR: Dr. Letheby, just look at these returns. Do you consider that they show a very fair amount of illuminating power? It is not so much defective?

Dr. *Letheby:* There is no defect, my lord; it is considerably above the requirements of the Act of Parliament.

The LORD MAYOR: The defect is that the gas is impure?

Dr. *Letheby:* Yes, impure—more than 5 grains of ammonia.

The LORD MAYOR: And a great many grains of sulphur?

Dr. *Letheby:* There is a large proportion of sulphur.

The LORD MAYOR (having consulted with Mr. Oke): I do not wish to be hard or vindictive, but only to ensure to the public a better supply of gas. The penalty, therefore, which I shall inflict is £10 per day for each of the days on which impurity is proved.

Mr. OKE: There are no costs here.

Mr. HAWKINS: My Lord Mayor, being present here, I desire to state at once that it is our intention to appeal against your lordship's decision. As I should like to look through the papers, I am going to ask whether it is necessary to give formal notice now, or whether we might enter into recognizances to-day, and give notice of appeal, say within 48 hours.

Mr. OKE: Within three days.

Mr. HAWKINS: At all events, if recognizances are taken, the grounds of appeal shall be served; it will then come on at quarter sessions. I do not wish to multiply costs by appealing on the ten cases—our grounds of appeal will cover everything.

Mr. NELSON: I cannot allow the learned counsel to be in court and out of court too.

Mr. HAWKINS: It is only fair to the corporation that I should ask whether they desire to have ten appeals tried or one.

The LORD MAYOR: Ten appeals on one subject!

Mr. HAWKINS: I think five of the summonses might be incorporated in one appeal—those for the defective illuminating power; and five in another—those relating to the impurity.

The LORD MAYOR: You must not hide away the books.

Mr. HAWKINS: I am going to explain that matter presently. I think it is due to you, and certainly to the directors by whom I am instructed, to state that they have been placed in a position of considerable difficulty during the last few months with regard to the supply of gas. An immense supply is absolutely required of them, and in order to meet the demand they are now, at an enormous expense, erecting very large works somewhere near Barking, which works will, I believe, be ready for occupation at the end of this year. In the meantime, I think if any little deficiency had been discovered either in the illuminating power or the purity of the gas supplied by them, some allowance might have been made by the corporation. It has not, however, been done, and therefore it should not be a matter of surprise that an attempt to impose penalties has been resisted. My reason for taking the part I have done before you, and declining to render any assistance in the case, is simply this—that having protested against your jurisdiction, if I had appeared officially and rendered facilities to the corporation to prove their case, I should only have prejudiced the objection I raised against your disposing of it. For this reason only I declined to take any part in the matter; but the investigation before the court of appeal will be a thorough one upon the merits of the case, and I myself do not despair, when before the Court of Quarter Sessions, of being able to show not only that the defendants ought not to be convicted, but that your jurisdiction is *ultra vires*. I shall also show that the little difficulty the corporation will be in, which the learned counsel has hinted at, if you cannot convict, is a difficulty brought upon them by those who promoted this Act of Parliament. It is certainly a very curious Act of Parliament—such a one as I never saw before.

The LORD MAYOR: Mr. Hawkins, if the Chartered Gas Company had turned round when these complaints were being made, and written to the corporation or to the gas examiner, and stated the facts that you have stated, I do not believe there would have been any prosecution. I am only now speaking from what I know of the general liberality of the corporation.

Mr. HAWKINS: They can now, after this explanation, do the handsome thing, and say, "We waive the penalties."

The LORD MAYOR: I would not do anything of the sort now. I would go for the uttermost farthing, because I believe the company have not dealt with us candidly and fairly.

Mr. HAWKINS: At all events the merits of the case will have to be discussed when the case comes before you.

Mr. OKE: The solicitor asks for a case as to the power of the Lord Mayor to mitigate the penalty.

Mr. HAWKINS (after consultation with his clients): I do not consent to anything.

The parties then withdrew.

On a subsequent day, Mr. Phillips, the secretary, and Mr. Trowby, the superintendent of the Chartered Company, attended and gave the requisite notice of their intention to appeal against the decision of the Lord Mayor, and they were respectively bound over to prosecute the appeal at the next quarter sessions, and to abide by the judgment of the court. The City solicitor does not proceed in his demand for a case.

SOUTHWARK POLICE COURT.—FRIDAY, JAN. 7.

Mr. *I. A. Crookenden*, the secretary of the Phœnix Gas Company, was summoned by William Shand, of 89, Union Street, Borough, under the 16th section of the Metropolis Gas Act, 1860, to show cause why the company should not supply his house, the Corner Pin beer-house, with gas, on £3 being paid them as the amount of security to be deposited.

Mr. EDWIN appeared on behalf of the Gas Company, and intimated to his worship that the £8 asked by his clients was not excessive, being £2 less than the amount claimed by the company for the last quarter's gas consumed at the Corner Pin by a previous tenant. The deposit was of no benefit to the company, as they paid the same amount of interest (5 per cent.) as upon borrowed money, and all they required was sufficient deposit to protect them from bad debts, and to enable them to reduce the price for the benefit of the public. He also informed his worship that the company always reduced a deposit after a quarter's consumption, if they found it all excessive; and a further reason for not accepting the complainant's offer was that, although one quarter's consumption was asked by the company, yet a much greater was really owing for every five months, it usually taking two months after the quarter to get the money due.

Mr. *Allingham*, the chief inspector in the company's service, proved that the character of the complainant's house had been very bad, and they found great difficulty in recovering the sum due for the gas consumed.

The COMPLAINANT admitted that the house had had a bad name, but he considered £3 deposit sufficient.

The MAGISTRATE, after a careful inquiry, was of opinion that the £8 sued for was not excessive, and he ordered the gas to be supplied on payment of that amount.

KINGSTOWN POLICE COURT.—TUESDAY, JAN. 4.

(*Before Mr.* DIX.)

THE ALLIANCE GAS COMPANY *v.* PATRICK DAWE; SAME *v.* JAMES DAWE.

Mr. CANTWELL (attorney for the gas company) stated that he appeared to prosecute in these cases, which in effect were for improperly and unlawfully consuming the gas of the Alliance Gas Company. Since he came into court he had had from Mr. Saunders, who appeared for the defendants, an intimation which for the present would confine him (Mr. Cantwell) to observations of a general nature with regard to the offences alleged against the defendants. In effect, the company asserted, and were prepared by their evidence to establish, that the defendants, who were brothers, in their several establishments at Glasthule, so dealt with the company's gas-meters that they consumed the company's gas without paying for it. He (Mr. Cantwell) then went through the various Acts of Parliament bearing on the subject, and pointed out the particular provision on which the present proceedings were founded, and by which pecuniary penalties to a comparatively considerable amount were claimed. Until he heard from his legal brother, Mr. Saunders, what course he intended to take, he (Mr. Cantwell) would, as he had promised, limit himself to general observations. Here, as in every other part of the world where gas was used, gas companies found that their shareholders property was dealt with in a spirit wholly irreconcilable with the ordinary notions of the rights of property. In abuse of the liberal views latterly taken of Stuart Mill's doctrine as to the non-ownership in land, air, and water, some advanced political economists seemed to think that gaslight entered into the immunity of the other elements of the professor's theory. It might be a pleasant, but to the gas companies it was no laughing matter, and he was there to prosecute, and to ask for convictions if the facts and evidence entitled the company to that protection. Any one or single case of fraud of the kind to which he adverted was trifling in its effects to the company, when measured by the standard of the amount of the ill-gotten gain to the dishonest consumer; but when viewed in the aggregate the loss which gas companies in the gross sustained by these frauds was enormous, and in the amount almost surpassed belief. But serious as that consideration was, it was in social sense secondary to those arising from the reflection that no culprit could practise a fraud of the kind in his establishment without planting in his family the seeds of immorality, and demoralizing his wife, children, assistants, and servants, in fact, everybody about him, whose misfortune it was to witness his wretched criminality and cupidity. It would give him (Mr. Cantwell) and the directors of the company sincere pleasure if both the defendants were able to establish their innocence in the cases now brought forward; and therefore, before he went further, he would desire to hear what Mr. Saunders had to say on the part of the defendants.

Mr. SAUNDERS stated that, as to Mr. Patrick Dawe, he would admit that what had happened to the gas-meter in his establishment brought him within the law, but yet there was no improper intention on his part, and that he would submit to a single penalty. With respect to the case of Mr. James Dawe, he was instructed to defend it, and was prepared to do so.

Mr. CANTWELL said that as Mr. James Dawe had so instructed his legal adviser, he would not for the present accept the single penalty in the case of the other defendant.

The case of Mr. *James Dawe* was then proceeded with.

Mr. *John Rogers*, examined by Mr. CANTWELL: He deposed that he was gas inspector of the Glasthule district, and on the 31st of October last, between twelve and one o'clock p.m., he went into the defendant's shop at Glasthule, where he found the gas burning in great excess; went behind the counter and found the joints of the meter loosened, and the meter itself tilted and thrown upon its face, so as prevent it from registering the quantities of gas consumed; had a conversation with the defendant on the following day.

Mr. SAUNDERS objected to evidence being given of certain portions of his conversation, and after some discussion as to its admissibility, proceeded to cross-examine the witness.

Upon cross-examination the *witness* stated that the meter could not have been "tilted" by accident. It required considerable force and some mechanical ingenuity to have placed it as it was when he found it on the occasion in question.

After some formal proofs and an argument by Mr. SAUNDERS that the disturbance of the meter was the result of accident, the case closed.

Mr. DIX said there could be no doubt that the defendant should be convicted, and the only question was as to the amount of the penalty.

The case of Mr. *Patrick Dawe* was then entered into.

Mr. SAUNDERS repeated his willingness to submit to a penalty, and he trusted the company would not be severe.

Mr. CANTWELL said that the company proceeded with great reluctance against Mr. Patrick Dawe, whom they believed to be a respectable man, and that he was led into the present scrape by bad example and vicious counsel.

After considerable debate the company consented to withdraw two of the four summonses, and penalties of £1 were adjudged against each of the defendants.

Mr. DIX said that, the cases being now over, he felt it right to declare in open court that in any future cases of the kind brought and established before him he would feel it to be his duty to deal in the most exemplary manner with them. It was not, in law or morals, short of robbery for any person to use the company's gas by improper means, in order to evade paying for it. However, he hoped that the results in these cases would have a salutary effect, and prevent any recurrence of the offence.

Mr. CANTWELL observed that he would take the liberty to add to what his worship had said, this warning—that in the event of any future case of the kind unhappily arising, the company would not proceed for pecuniary penalties, but would proceed by indictment for larceny, a course of proceeding which the state of the law and the nature of the offence would fully justify.

SHEFFIELD WATER-WORKS COMPANY.

MONDAY, DEC. 27.

The inquiry into the regulations proposed to be adopted by the company was resumed at the Town-Hall this day, the magistrates present being Mr. T. DUNN and Mr. J. J. SMITH.

The company were represented by Mr. POLLOCK and Mr. MACRORIE; the corporation by Mr. BLACKBURN; and Mr. Tennant and Mr. Toothill by Mr. BARKER.

Mr. BLACKBURN asked for the plan of the water-works, which Mr. Pollock ought to have deposited with the town-clerk, and which was to have been produced at an earlier stage of the proceedings.

Mr. POLLOCK said he was not aware that he had made any such promise.

After a long argument, the BENCH said they had no power to order it to be produced.

Mr. POLLOCK then handed in a number of documents representing the rules of other towns.

Mr. BLACKBURN said there was no evidence to show that those rules, since they had been passed, had been altered, abrogated, or modified.

Mr. BARKER objected to the rules being put in by Mr. Pollock until they had been legally proved.

Mr. DUNN said Mr. Blackburn and friends would have an opportunity between then and the next day of examining the rules.

Mr. BARKER said he felt it to be an extreme hardship upon them, as they had not had an opportunity of seeing those rules before they were called on to address the court; nevertheless, as the bench appeared in favour of receiving the rules, he would waive his objection.

Mr. BLACKBURN, in addressing the bench, said that the Corporation of Sheffield and Mr. Moore, through him, objected to the passing of the regulations which were now put before the bench. Such regulations were to be confirmed, altered, or modified by two justices. There could be no undivided opinion upon the regulations; they must be signed by two justices. How was it that the company were obliged to come before the magistrates? As was well known the company had been unable—and he did not want to go into any bygone questions—to fulfil the obligations which they had undertaken to fulfil when they went before Parliament and obtained their various Acts. They would see the difficult position in which the corporation was placed, and their position, he might say, was almost unprecedented. They had been before the magistrates days and days, and an eminent engineer—an admirable witness—one whom everybody respected as a constructive engineer, had shown them, upon examination, that a certain code of rules which had been put before them was, in his opinion, reasonable. Every point of difficulty which had been raised by the corporation, and to which the latter objected, had been altered in the bill which was now placed before Parliament. The company had failed in supplying the town with water. Unfortunately, an accident—he would call it so before them—occurred some years ago, and the bursting of a dam took place. The result was no doubt that to a great extent the company suffered, but the town suffered more. After that an Act of Parliament was passed which allowed them to put on something like 25 per cent. for 25 years, upon the condition that they gave a constant supply when required by the Town Council. The bench had dropped a hint that they considered the company had a right to come and say that those regulations were reasonable, and the argument he should put forward was that they were not reasonable; because, in the first place, they were *ultra vires*. In the second place the company had no right to ask the bench to pass those regulations until they had put themselves in a position to ask for those regulations to be carried. Section 7 of the company's Act of 1866 provided that—"No such regulations which shall be made by the said company shall be valid or binding unless the same shall be allowed by two or more justices assembled at some petty sessions for the borough, and it shall be incumbent on such justices, on the request of the said company, to examine into the regulations which may be tendered to them for that purpose, and to allow of, or disallow, or to modify, alter, and vary the same, or any of them, as to them may seem meet." The bench would see that they were to test the reasonableness of the regulations, and the best way to do that would be by the company's own evidence and intentions. He was prepared to show that the regulations which the company were asking the bench to pass had been altered, varied, and modified in their bill. And why? Because the gentlemen who had been called to give evidence on behalf of the company, having been subjected to a cross-examination with regard to the rules in force in other towns, had been obliged to alter their views, and the result was that the company were asking Parliament to grant an entirely different system from that they were applying to the bench for. The regulations the company were asking the bench to sanction could not be reasonable if those they were asking Parliament to pass were reasonable. Surely the corporation had a right to say that they had not been fairly treated by the company.

Mr. DUNN said the bench had power to modify any of the regulations.

Mr. BLACKBURN said the company asked the bench to pass the regulations upon the one ground that they intended to give a constant supply of water. In their bill they asked for power to get rid of their obligation to give that supply. Mr. Hawksley and other witnesses had said that it would be idle and absurd to expect that any company could, under a period of ten years, carry out the system they were now wanting to adopt. He and his friend, Mr. Tennant, asked Mr. Hawksley if they intended to put consumers at once under those regulations, and compel them to carry them out. The answer was that it would be idle and absurd to suppose that such a thing could be done. Another question was put, and the answer was that if the rule were strictly construed it would be ridiculous and absurd. Mr. Pope said that the magistrates were asked to pass those regulations because "they were bound to believe the evidence of Mr. Hawksley that the company would not at once carry out those regulations." According to the present powers of the company, they had power to say that the consumer should not waste water. They could bring the consumer before the magistrates, and compel him to stop the waste within 48 hours, subject to a penalty of £5 a day. They must remember the powers which had been given to the water company, the jealousy with which they had been treated by Parliament, and the fact that no regulation could be passed except before two magistrates. When they took all these things into consideration, and saw how the company had treated the town, was it reasonable that those regulations should now be made? Taking the regulations one by one, were they reasonable? Although the company might have come before the magistrates to pass reasonable regulations as far back as 1860, yet, after having allowed nine years to elapse, with all the skill and science at their command—and after having allowed fittings, fixings, and pipes, and other apparatus to be fixed of a certain strength—they now proposed not only to prescribe for the future, but to arbitrate for the past. Having read the first regulation, he said that if that regulation had been carried out as it was first laid before the magistrates, the expense of carrying it out would have been imposed on the consumer. In their present bill before Parliament the company proposed, *at their own cost*, to provide every ferrule whereby the consumer's pipe was connected with any pipe of the company, and the aperture in every such ferrule should be of such size as would pass a supply of water sufficient for the purpose required. That was the company's idea of what was reasonable. Was it reasonable to ask a bench of magistrates to decide whether certain regulations were reasonable, when in March next every one of them might be altered according to the company's will if the latter got their Act?

Mr. DUNN: Do you not think the force of the argument will depend upon whether or not we are obliged to pass the regulations as they are submitted to us by the company? Is there anything to prevent us passing over the regulations laid before us, and substituting for them the regulations of the bill before Parliament?

Mr. BLACKBURN: You cannot do that.

Mr. DUNN asked if there was any hope of there being any agreement entered into between the two parties with reference to the rules.

Mr. POLLOCK said that, supposing they went to Parliament in the forthcoming March, and then for the first time submitted the regulations, they might be asked why they had not laid them before the justices. It might be advanced against them that they had shirked the responsibility of going before the magistrates in their own town, and then they would be in a dangerous position.

Mr. DUNN: Supposing we come to a decision here upon these regulations, it may be set aside by the House of Commons. It seems to me to be a waste of time to fight the matter here. Had you not better consider whether you can, consistently with your duties to your clients, withdraw the resolutions? Suppose we adjourn for a quarter of an hour for you to consider that.

The learned counsel retired to consult with their respective clients, and after being absent about half an hour the court reassembled.

Mr. POLLOCK announced that the water company, being bound by their Act

felt that they must obtain the decision of the magistrates upon the regulations, and therefore the inquiry must go on.

Mr. BLACKBURN thereupon resumed his address, and said he should be able to show, by a great amount of testimony, that the waste of water of which the company complained arose not so much from the apparatus of consumers as from the bad state of their own mains. In conclusion, the learned counsel contended that whatever regulations were passed, they ought only to apply to future fittings, and not to those already in existence.

Mr. BARKER next addressed the court. He said the whole gist of the inquiry was as to the reasonableness or unreasonableness of the regulations submitted by the company. Unless the bench were satisfied of their reasonableness, they would not be justified in giving them their sanction. To satisfy the bench that they were reasonable, the company must prove three things—1. That waste and misuse of water actually existed at the present time, such waste and misuse being attributable to the defective fittings of the consumer. 2. That the existing powers which the company had under their several Acts of Parliament now in force for preventing the waste and misuse of water were insufficient in themselves. 3. That the regulations which they now proposed were in themselves reasonable and proper, and calculated to remedy the defects of which they complained. He proceeded to argue that the company had failed to prove either of these propositions, and submitted that the regulations were altogether unreasonable, and that they would give power to the company to insist upon their being instantly adopted by every consumer, if they thought proper. He concluded by handing to the bench a set of modified rules, to which, he said, his client agreed.

Mr. TENNANT having briefly addressed the bench,

Mr. *Holmes*, the borough surveyor, was called, and examined by Mr. BLACKBURN: He said he considered that the mains of the company were exceedingly defective. Many of them were actually rotten, and would not stand the slightest interference with them. Some of them broke with the slightest stroke of an axe. He could cut and pare some of them with a knife when they first came out of the ground. In Bower Spring in one instance in which a men-hole was removed, water was propelled into the air in a volume of 1½ inch in diameter. It went as high as the housetops. The regulation No. 1 was unreasonable. During his experience in the town he had known hundreds of instances where the water escaped and was wasted through the badness of the company's pipes. He produced some specimens of the pipes which had been taken out of the ground by workmen in the employ of the borough. They were so rotten that they could be cut through with a knife when they were first taken out of the ground, but they had since hardened with exposure to the air.

In reply to Mr. BARKER, *witness* said that a large amount of the water which left the company's reservoir was each day lost owing to their defective mains. A lesser quantity would no doubt be lost by defective consumers pipes. His opinion was that if the company had carried out their Act of 1860, there would have been no necessity for the proposed regulations.

By Mr. POLLOCK: He believed a ferrule was necessary, but he did not see why the ferrule should not be of the same diameter as the communication-pipe in a perfect system of water supply. At all events, if the ferrule was to be smaller than the pipe, the size should be determined upon by some independent authority, and not either by the corporation or the company.

Edward Bailey, foreman to Mr. Holmes, was called to speak to the leakage which was discovered in Bower Spring. He said the leakage was not caused by any damage being done to the pipe by the corporation men, as they saw the leakage before they got to the pipe. He then sent for some of the company's servants, and it was they who dug down to the pipe.

TUESDAY, DEC. 28.

Mr. *M. W. Jackson*, the engineer of the Melbourne Water-Works, and consulting engineer for the water-works at Sydney, examined by Mr. BLACKBURN, said that, judging from the evidence he had heard in court, he should think a loss of water from the Sheffield Company's mains was inevitable. From his own experience he knew of two instances of leakage caused by the company's defective pipes, and one of the leakages, he believed, had been going on for some days before it was remedied. If mains had been laid for twenty years and had not been renewed, there must be a large waste from them, as pipes became rotten sometimes in the course of three or four years; indeed, he had been able to cut them with a small penknife. His opinion was, that unless mains were laid on stone slabs or planks, so as to give them a solid foundation, a heavy weight, like a steam-roller, passing over the road, would cause a leakage from the joints. He considered that regulation No. 1 was unreasonable, and contrary to the spirit of the Act of 1847. If the company were allowed to use such a ferrule as he believed they desired to use, the water would run seven times as slowly as it ought to run. A pea ferrule was not of any use to the company in preventing a waste; it was only of service in this respect, that it prevented the water from running fast, and thus did away with the necessity of having larger mains. He produced a copy of the regulations in force at Manchester, and said he did not find anything in them which referred to a pea ferrule.

Mr. *Robert Owen*, of Manchester, a plumber, authorized by the Manchester Corporation, said the pea ferrule was not allowed to be used in Manchester, though the water was under constant pressure.

By Mr. POLLOCK: The pressure was 478 feet maximum, and 275 feet minimum. There was a power in the hands of the Corporation of Manchester to limit the size of the service-pipes, but he was not aware they could limit the size to any degree they liked, provided that the pipes could furnish a sufficient supply.

By Mr. BLACKBURN: The pea ferrule was not necessary where there was a constant pressure.

Mr. *Jackson*, on being again examined, said that in the case of Manchester, in addition to appeal before two magistrates, the consumers had a remedy every November, as pressure could then be put upon the candidates for the corporation. That was not the case with an ordinary trading company like the Sheffield Water-Works Company, as the only appeal against the regulations which might be passed by the magistrates was in the Court of Queen's Bench. Witness handed in the regulations in force in a number of towns, and said that, from inquiries he had made, he had not been able to ascertain that Mr. Hawksley, in any town where district mains had been laid under his direction, had adopted the pea ferrule. He did not think such a ferrule would prevent waste of water, except under very exceptional circumstances.

John Horsfield, a pipe-layer, said he was for ten or twelve years in the service of the water company, and was well acquainted with, perhaps, 40 miles of their mains. The pipes were laid in the earth, without any protection except under special circumstances. The dirt ate the pipes away, and many of them were in a very bad state. He saw perhaps 120 yards of bad piping while in the service of the company. He had seen other pipes which, though not cracked, were very much eaten away. The pipes in about ten streets were in a much worse state than in some others. In most cases where water escaped it came to the surface, but he had known a case where it had gone into a drain. Where such a thing occurred there would be a lack of pressure in the houses in the high parts near, and the leakage would be looked for and the main repaired.

By Mr. POLLOCK: The company gained nothing by having imperfect pipes, and they did their best to repair them as soon as complaint respecting them was made.

Mr. *Thomas Moore*, mayor of Sheffield, said he had repeatedly known of water-pipes bursting in the streets of the town, and gave instances in which they had remained unrepaired for some days, and even weeks. He had suffered much inconvenience from the non-constant supply of water. He had recently erected upon his premises a tower, and had he known that a constant supply of water would not be given, he should have had a water-tank placed under it. If the intermittent supply continued, he should have to take the tower down and rebuild it. In summer-time, when the water was on only some two or three hours per day, he had difficulty in carrying on his business, because he had not vessels large enough to hold as much water as was required. Both as a ratepayer and as mayor of Sheffield he had complained to the company respecting the non-constant supply. He also thought it unreasonable that a consumer should be compelled to alter his fittings at his own cost. The company, he thought, if they required fittings to be altered, should bear the expense.

Mr. *John Pitt*, plumber, of Sheffield, said he considered, so far as the consumer was concerned, that both the first regulation and the altered regulation in the bill were unreasonable. He thought a person should be appointed to arbitrate between the company and the consumer as to what sized ferrule should be used. He then gave instances of leakage from the company's pipes.

WEDNESDAY, DEC. 29.

Mr. *Foster*, C.E., engineer for water-works at Blackwood, Fleetwood, and Lytham, said he had read the first regulation, and in his opinion it was unreasonable, because by it the company would be enabled to fix a ferrule of any size they thought proper, and if a small pea ferrule was put down the supply of water would be restricted, and consequently one of the greatest benefits of a constant supply would be done away with. In the case of a large leakage from fittings the pea ferrule would prevent waste, but it would also seriously restrict the supply. The only use of the ferrule was to prevent large leakages; it would not check the multitude of small leakages which were believed to be the cause of the great waste. The ferrule was of no use to the consumers, except in cases of full-bore water; in other cases it might possibly create waste. From what he knew of the mains in Sheffield, he believed the ferrule would be of service to the company, but not to the consumer. The effect of its adoption would be to enable persons living in the higher portions of the town to draw water when now they could not do so. The pea ferrule would not be required if the mains in Sheffield were of a sufficient size. He was not aware that the pea ferrule was of any service in preventing waste and concussion.

Mr. *Charles Gott*, C.E., engineer of the Bradford Water-Works, said in his opinion regulation No. 1 as it stood at first was unreasonable, because it gave to the company the absolute power to restrict the supply of water by inserting a ferrule, and from the evidence it seemed that the company were intending to restrict the supply in a manner which appeared very objectionable. As altered, the regulation in question did not seem very objectionable in itself, but taking it in connexion with the evidence, he did think it so, as it allowed the company full power of control without appeal. The pressure at Bradford was very great, and the town was supplied in two districts, the pressure in the low level varying to 300 feet, the minimum being about 20 feet, whilst the higher level had a greater range with a maximum of 500 feet pressure. Pea ferrules were not in use at Bradford, nor any contracting ferrule. The use of them had been gradually discontinued, as they were found to be inconvenient, and gave rise to complaints that insufficient supply was given through them, and because they were liable to become choked, which led to great expense and waste. Though these ferrules were not in use at Bradford, there was practically no waste, and the loss had certainly not increased since the pea ferrule was discontinued. There was a constant supply, and therefore cisterns became unnecessary. The smallest ferrule used in Bradford was a ⅝-inch, and the smallest service-pipe for the consumer was a ⅝-inch.

Mr. *Henry Tomlinson*, manager of the Cambridge University and Town Water-Works said he objected to the pea ferrule because it improperly restricted the convenient use of water, and further induced waste. At Wolverhampton, where he was formerly engaged, it was found that the use of small pipes resulted in waste, and they had larger ones put down. The waste arising from defective fittings would not be reduced by the pea ferrule. The lowest diameter of service-pipe allowed in Cambridge and Wolverhampton was ½-inch, and the ferrule was part of the pipe. The consumption at Cambridge, apart from the water supplied by meter, was 12 gallons per head of the population supplied. Formerly it was 22 gallons per head. The maximum pressure there was about 150, and the water was pumped from springs in the chalk formation.

Mr. *Isaac Booth*, architect and civil engineer, Halifax, said the introduction of the pea ferrule necessarily acted as a serious check upon the flow of water through the service-pipe, and would almost reduce the constant to an intermittent supply of water. He had never adopted the pea ferrule in the works with which he was connected. In the absence of cisterns, and with a constant supply, the application of the pea ferrule would cause very great inconvenience to the consumers.

Mr. BLACKBURN: Having heard the whole of the evidence, do you see any reason why the pea ferrule, if there is to be constant supply and the mains are good, should be at all adopted?

Witness: None whatever.

Mr. *Bernard Seale* said he had been a plumber in Sheffield for 33 years, and from time to time he had seen the condition of the mains of the water company. Of late years they had been in a very poor and dilapidated state. He remembered the time when the company had not an iron main in the town. He knew, from practical experience, that a great deal of waste was caused through leakage. He was of opinion that the diameter of the ferrule should not be less than three-eighths of an inch, and no smaller one ought to be used. In case of constant supply, if there was a restricting ferrule a concussion would ensue, but not such as would be detrimental to the pipe. If a screw-down cock was used there would be no concussion.

Mr. *William Bissett*, a plumber of 20 years experience in Sheffield, gave instances in which ferrules had been put down by the company which were so small as to hinder the consumer from obtaining a sufficient supply. It was extremely inconvenient for the company to have control of the size of the ferrules. He related a case where the water company had taken out an old ferrule and enlarged it for the purpose of enabling the consumer to get a proper supply, and they did it at the expense of the latter.

In answer to Mr. POLLOCK, *witness* stated that pea ferrules were in constant use in Sheffield and other places. He had seen many ferrules smaller than one-eighth of an inch in diameter provided by the Sheffield Water Company.

Mr. *William Genn*, a plumber in business for 15 years, had very great objections to the limitation of the size of the ferrule by the company. From his experience as plumber to the Sheffield General Infirmary, the inconveniences arising from contracted ferrules were apparent. Sometimes he had to open a stop-tap, which brought water out of the 5-inch pipe laid across the fields adjoining the institution in order to get a supply. The storeage-cisterns were often empty.

By Mr. POLLOCK: Had not complained to the water company about the matter, or laid it before the board of governors.

Mr. *Bernard Seale*, on being recalled, explained that he had bored, unknown to the company, a good many ferrules in the town to make them a little larger. The iron mains were first laid down about 38 years ago.

Mr. *Gunson* said some 9-inch iron pipes had been laid from the old dam house to the feed reservoir at Portobello, at that time, which were in a good state, and did not leak up to the present day.

Witness thought they would not be sufficiently strong to bear the pressure the town of Sheffield now required. Fourteen years ago he superintended the laying of 25 miles of piping for a new gas company, and in the course of the work he had frequently seen that the pipes of the Sheffield Water Company were patched up and repaired, and generally in a dilapidated condition. If a person inspected

pipes recently laid in Saville Street East by the company, he could run his shovel right through them. The worst material in which iron or leaden pipes could be laid was smithy slack and ashes.

Mr. POLLOCK said the company were willing to lay bare the pipes for the inspection of the magistrates in the places where the witnesses had spoken of them as being very much worn.

Mr. DUNN said it would be ridiculous for the magistrates to inspect them, and suggested that a competent party from both sides should inspect the pipes in the neighbourhood of Millsands, and the main in the Wicker, and report the result of the investigation.

Mr. *W. J. Thompson*, contractor, said that during his excavations in connexion with the main drainage of Sheffield he had many opportunities of observing the state of the mains belonging to the water company. They were generally in a very bad condition. He discovered several leakages in Russell Street, and in one place the water ran into the sewer. In Green Lane the pipes were in a rotten state. He had paid altogether about £19 for damages done by his men to the pipes in consequence of the slightest touch of the pick being sufficient to penetrate them.

This closed the evidence in opposition to the first regulation.

On regulation 2,

Mr. BARKER submitted that it was incumbent on the company to prove that there was something like a necessity for asking the magistrates to pass the new regulation, and the company had entirely failed to show that the pipes used by the consumers required an alteration such as was proposed. He pointed out that the witnesses called by the company only gave theoretic, and not practical evidence. He should call plumbers who would say that the pipes now in use were sufficient for the purposes required, and that there was absolutely no occasion for insisting on the adoption of so arbitrary a regulation. The pipes proposed to be put down by the company were of excessive thickness, and would have to be specially manufactured to meet the requirements of the rule. In case the magistrates consented to the regulation, he suggested that the following proviso should be added:—"And provided also that no consumer shall be compelled to lay, fix, or renew any pipe or pipes unless and until the pipe or pipes for the time being in use by him shall be found to tend to the waste and misuser of water. Every joint to be made in any pipe used for the conveyance of or in connexion with the water supplied by the company under pressure should be of the kind called a plumbing joint."

Mr. BLACKBURN addressed the court in opposition to the regulation, after which

Mr. *Jackson* was called. He gave it as his opinion that the regulation was very objectionable, because it proposed to compel consumers to remove fittings without leaving them any appeal. He did not attach much importance to it prospectively, but retrospectively it would be most serious in its effects upon the consumers.

Mr. *Foster* thought that the weight of the pipes should be specified in every case, but it was unreasonable that the fittings now in use should be taken up because they were not sufficient in weight. If there was to be a hard and fast line, the Manchester principle regarding the weights was the best. He also remarked that stop-cocks were desirable.

Mr. *Tomlinson*, Mr. *J. B. Corry*, and Mr. *Booth* gave evidence, in the main agreeing with the previous witnesses.

Mr. *Robert Owen*, Manchester, plumber of 30 years standing, said the powers sought to be imposed in the regulation were unreasonable, and left no discretion to the consumer. The weights were heavier than necessary. For pipes under pressure he should recommend plumbing joints.

Mr. *William Bissett* agreed with the evidence of the former witness on regulation No. 2.

Mr. *Bernard Seale* said he had estimated the cost which the proposed alterations would entail on the town of Sheffield, and he found it would amount to £150,000. If the whole of the regulations were carried out, every cottage-house would have to pay 22*s.* 6d., and every house rented at £40, £25.

THURSDAY, DEC. 30.

Mr. *Genn*, plumber, Sheffield, was recalled, and explained that when difficulty was experienced in obtaining an adequate supply of water at the Infirmary, he brought the matter at once before the weekly board.

Mr. BLACKBURN proceeded to regulation No. 3, which provided that no pipes used for the conveyance of water should be put through any sough.

Mr. POLLOCK said in some cases it might prove inconvenient to compel consumers to encase any communication-pipe laid down in soil composed of earth, rock, or shale, but in many instances such compulsion was highly necessary.

Mr. BLACKBURN subsequently put his objection in the form of a proviso exempting present consumers from encasing their pipes, and intimated his willingness to allow the regulation to pass with that alteration.

Mr. *Holmes*, borough surveyor, objected to the regulation on the ground that it gave too much power to the company, and that it was not reasonable to compel the encasing of the pipes.

Mr. *Jackson* was of opinion that the regulation would be reasonable if the corporation had the management of the Sheffield Water-Works Company, but thought it was an arbitrary power to place in the hands of any trading company. Every pipe in the town might be made subject to the rule.

Mr. *Foster* gave similar evidence.

On regulation No. 4, Mr. BARKER and Mr. BLACKBURN having addressed the bench against this regulation,

Mr. *Jackson* was called, and said there was no necessity for the company possessing such a power as would be given them if the regulation were passed. It would give them power to dictate to consumers, and to unreasonably interfere with their fittings; it would affect architects, builders, and contractors, and would give them power grievously to annoy the consumer. In fact there was no limit to the time when an inspection might take place.

Mr. *Foster* also considered that sections 16 and 17 of the Act of 1803 were amply sufficient with regard to what was proposed in regulation No. 4. Retrospectively such a regulation should only apply to defective fittings, and prospectively the consumers should be at liberty to lay down their pipes in whatever position they thought proper, providing that they conformed to the requirements as to size and weights of pipes, and other conditions.

Mr. *Booth*, for similar reasons, considered the regulation under consideration decidedly objectionable, as he was of opinion that any such interference as that proposed by the company would be most unreasonable. It would have the effect of importing into every contract a condition which would be both prejudical and obnoxious.

Mr. *Tomlinson* gave evidence to the same effect as that given by the three former witnesses.

Mr. *Bernard Seale* also considered that the effect of the regulation, if passed, would be very injurious to the consumer, and was unnecessary.

Mr. *Bissett* was of the same opinion.

Mr. *S. F. Holmes* thought the regulation most unreasonable. The company had no right to have such absolute control over the position of the pipes, nor ought they to be allowed to interfere with the fittings in the manner proposed. He considered that the company ought not to be allowed any such power as was now sought while there were such *laches* on their part as had been shown to exist. He mentioned that on that very morning, in constructing a drain from Glossop Road to Gell Street, a serious leakage had been disclosed in one of the company's 9-inch service-pipes. It was a fracture in the direction of the pipe, and the escape under pressure, when there was not much water being drawn off, would be enormous. Even during the morning they found that two buckets were filled from it in a few seconds of time. The fracture did not arise from any displacement of the pipe at all, but had evidently existed for some time.

Mr. BARKER, having briefly stated that his suggestions with regard to regulation No. 5 were embodied in the alterations proposed by him when the case for the promoters was being gone through,

Mr. *Foster* was called by Mr. BLACKBURN, and stated that, in his opinion, the regulation as it stood was unreasonable. He considered that every tap under pressure should be a screw-down tap, but under other conditions it was unnecessary, and other kinds of taps would do, providing they were of proper material and well made.

Mr. *Tomlinson*, Mr. *Jackson*, and Mr. *Booth* gave evidence to the same effect. It was mentioned by Mr. Booth that the only condition imposed by the Halifax Corporation on the consumers of water, with regard to taps, was that Guest and Chrimes stop-cocks should be used, and fixed as near the main as possible.

Mr. TENNANT said the only objection which seemed to arise with regard to regulation No. 6 was that it did not set forth who was to have possession of the key of the stand-pipe, and it was desirable that instead of only one key being provided and kept by some one for the use of all, every person in the court or other place who was to be supplied from the stand-pipe should have a separate key.

Mr. POLLOCK remarked that it was so refreshing and cheering to hear of the corporation having no objection to any one of the regulations, he almost felt disposed to present them with the keys.

Mr. *Jackson* suggested that the words "open with a *moveable* key" should be added to the regulation.

Mr. BARKER then brought forward his suggested alteration of the 7th regulation as proposed, and called

Mr. *John Toothill*, who said he had been in business as an estate agent for 27 years in Sheffield, and upon some of the property in his possession there were underground cisterns which had been in existence more than 20 years, and were still perfectly water-tight. They were open to inspection, and had been inspected from time to time by the company's officers. In these cases there were no other means of storing water, and the property would, under the regulations prohibiting underground cisterns, be deprived of water for a certain number of hours per day. The tenants would thus suffer great inconvenience. The witness mentioned an instance in which 15 of his houses in Broomspring Lane, where no cistern was provided, had suffered very great inconvenience in consequence. He was served with a notice by the company to repair a leakage, and on going to make inquiries he found that all the 15 houses were without water. He called at the company's offices, and was told that the leakage would be discovered and set right again at once, so he gave orders for the company's men to do it. The houses were left without water for 14 days, and it was discovered that the water was in reality escaping, not by any leakage in his pipes, but from a service-main belonging to the company; for at the bottom of Broomspring Lane the whole of the water was running from the main into a drain, so that the entire street was without water. Had there been an underground cistern for the houses, the tenants would not have been deprived of water at all perhaps, or only for a very short time, instead of all the 15 houses being without for a fortnight.

Mr. *Jackson*, examined by Mr. BLACKBURN, said he considered that it would be reasonable to prohibit the use of underground cisterns for the future. He considered the present regulation unreasonable, having a regard to the present system, and to the fact that in 1860 the company could have given the people notice as to what kind of pipes, &c., were to be employed. He thought existing cisterns ought not to be removed until a constant supply had been given for twelve months.

Mr. *Foster*, examined by Mr. TENNANT, said he objected to the underground cisterns. They were not necessary when there was a constant supply. He was then cross-examined as to the meaning of the term underground cistern.

Mr. *William Genn*, examined by Mr. BLACKBURN, said he considered it unreasonable to remove underground reservoirs until a constant supply was given.

Mr. *Booth*, Mr. *Bernard Seale*, Mr. *S. F. Holmes*, and Mr. *Corry* also gave confirmatory evidence.

On regulation 8,

Mr. BLACKBURN said there did not seem any particular objection to this regulation, provided that no alteration be made in existing cisterns at the cost of the consumer, save in those cases provided for by the 17th section of the Water-Works Clause Act, 1863, and though they did not admit it reasonable or necessary at all, they would raise no objection if this proviso were added.

Mr. *Jackson* was of opinion that the regulation as it stood was surplusage, and thought the proviso suggested should be added if the rule were to be passed.

Eventually the objections were withdrawn.

FRIDAY, DEC. 31.

Mr. *Holmes*, in reference to a leakage which he had mentioned as having been discovered in Gell Street from one of the company's pipes, said he was bound in fairness to say that he had made a mistake. There was no leakage from the company's pipes, but there was a spring immediately beneath the place which he had mentioned.

On consideration of regulations 9 and 14,

Mr. *Jackson* said that with regard to the prevention of overflow or waste pipes, as stated in regulation 9, he considered that unreasonable, as much damage might be done to a person's property through the adoption of that course. He approved of a detective pipe being fitted to cisterns in order to prevent any waste of water. If such a pipe was fitted to existing cisterns it should be done at the cost of the company, and the pipe should be placed so that its outflow would be immediately noticed. Rule 14 proposed to apply the same system to baths as was sought to be applied to cisterns.

Mr. *Foster* said he had examined the two regulations, and considered that the detective pipe should be so fitted as not to cause any damage to the property of the consumers. He hardly saw any necessity for "tell-tale" pipes, as stated in rule 14, and the waste-pipe did not usually allow of much waste of water. He did not think it reasonable to charge the consumers with any alterations of the present system.

Mr. *Isaac Booth* said regulation 9 was in itself unsound, inasmuch as the first part of it entirely prohibited the attachment of an overflow or waste pipe to a cistern. That he considered to be a most objectionable provision, and if carried into execution it would result in most oppressive action upon the consumer, rendering him liable to much risk, great damage, inconvenience, and nuisance. The proviso for the protection of the consumer was not sufficient. The same remarks applied to No. 14.

Mr. *Tomlinson* coincided with the opinions of the former witnesses.

Mr. *Corry* said he considered that cisterns in every case should be provided with overflow-pipes. At the Sheffield Club the ball-tap burst, and although there was an overflow-pipe fitted, the water ran over into three floors of the house, ran out of the door of the house, and great damage was done. The accident took place in the night, when no detective pipe could have been seen. He would have a detective pipe placed beneath the level of the overflow-pipe, so as to give warning of anything being wrong in the cistern.

In reference to regulations 10, 11, 12, and 13,

Mr. *Bernard Seale* was examined by Mr. TENNANT, and said the present pan closet he considered effectual and good in all cases. A double-action system in the cistern was very objectionable. It had been in use 25 years in Sheffield, but not under the name of the "boot" system. Closets on that plan had been fixed in the General Infirmary for 25 years, but would never act. They had had to be taken up. The consumers had never been told by the company what description of closets they preferred. He considered that the use of the "rod" in the appa-

ratus was ridiculous. The wire was proper, and any plumber with common sense knew that. He considered a chain to a single valve as better than anything.

Mr. *Pitt*, plumber, said it would be wrong if the company were allowed to fit the double-valve system. The changing of a single-valve system into a double one would be very costly. He acquiesced in the opinions of the former witness.

Mr. *Tomlinson*, Mr. *Owen*, and Mr. *Jackson* were called to show the unreasonableness of the regulation.

On regulation 15,

Mr. *Jackson* said this regulation was under any circumstances entirely unreasonable, and prejudicial to the interests of the town. The consumer ought not to be tied down to a particular description of meter prescribed by the company.

Mr. *Foster* said if the regulation passed the company would have the power of insisting upon a particular meter or upon a high-pressure meter.

Alderman *Saunders*, as a consumer and a ratepayer, regarded the rule as very unjust and very unfair, because the company's inspector had the power to enter a house, take away a meter, and keep it for 48 hours, thereby depriving the parties in the house of the supply of water. Supposing it was found that the meter was incorrect, and that this was disputed by the owner, they could keep it for any length of time, leaving the occupiers of the house entirely without water. He was chairman of the Health Committee, who had the management of the public baths, for which a vast quantity of water was used; and it would be extremely inconvenient if the inspector employed by the company were to keep the meter away unjustly for 48 hours, and perhaps for two or three weeks, providing that the committee did not agree with him in his opinion. There was no provision in the regulation to avoid that inconvenience.

Mr. *T. Moore*, the Mayor of Sheffield, stated that the power of the company might be so used as to materially injure the consumer.

This concluded the whole of the evidence on the part of the corporation.

SATURDAY, JAN. 1.

Mr. DUNN said before commencing the business he wished to read a statement which had been prepared in explanation of the reasons which led the magistrates to make the suggestion which met, unfortunately, with strong opposition from Mr. Blackburn on behalf of his clients:—Scientific evidence had been given as to the comparative merits and demerits of the pea and other ferrules, and it was urged by the objectors to the proposed rules that if the pea ferrule were authoritatively adopted, there would be great loss of time to the consumers in obtaining the supply of water. The justices, therefore, determined to ascertain by actual investigation what time was at present consumed in obtaining a given quantity, and gave instructions to a public officer to ascertain the facts, directing that the investigation should be made without previous communication or preparation with any one. The investigation was made on the 30th ult., and the return they now laid before counsel for the perusal of both parties was handed to them on the morning of the 31st. As the return showed considerable discrepancies as to time, they were desirous to have a similar one prepared by persons appointed by the conflicting parties, to be drawn up with the same promptness and the same want of previous arrangement and preparation as that had been. They deemed this explanation necessary owing to the fact that their request was not complied with.

Mr. BARKER then addressed the bench on behalf of Mr. Toothill, and Mr. BLACKBURN on behalf of the corporation and of Mr. Moore.

Mr. POLLOCK summed up the case for the company, and this closed the inquiry.

Mr. DUNN said he hoped the bench would be able to give their decision before the meeting of Parliament.

Miscellaneous News.

GREAT CENTRAL GAS CONSUMERS COMPANY.

The Adjourned Half-Yearly Meeting of the Shareholders of this Company was held at the London Tavern, on Friday, Jan. 7. The meeting was also made special, for the purpose of considering a bill to be promoted by the directors in the next session of Parliament, to authorize the company to raise capital for further works, and to provide for the loss occasioned by certain frauds committed upon the company, and for other purposes.

Alderman Sir THOMAS GABRIEL (the deputy-chairman) presided, and on taking the chair expressed his regret that Alderman Dakin, the chairman of the company, who is on his passage home from America, had not arrived in time to occupy his usual place.

The SECRETARY (Mr. R. M. Massey) having read the notice convening the meeting,

The CHAIRMAN said: Gentlemen, you will recollect that when we met here at our last public meeting, we adjourned for the purpose of this day reporting to you the result of any negotiations we might be able to carry on relative to our proposed bill, and to submit to you in detail the provisions of the bill itself. With regard to the negotiations, we have but little to report to you. We have had two or three communications with the City authorities relative to our bill, but we have not succeeded as yet in coming to any definite conclusion with them. It was at a period of the year when, as you know, the City committees are drawing to the close of their existence; they go out of office when the Common Council dissolve, which is on the 21st of December, and they are not reconstituted until the new Common Council meet. Our negotiations, therefore, will have to be reopened with the new committee, and in the meantime we have endeavoured to frame a bill which, we think, is so manifestly fair and just, that we do hope we shall be able to satisfy them, that they really ought to give it their sanction, in which case it will pass without opposition. If, however, we are not so successful, we can only rely upon the fair and just character of the measure itself to carry it with the committee of the House of Commons. We shall do all we possibly can to meet the views of the corporation committee relative to the bill, and we are not without hope that we may be able to satisfy them. If we cannot, as I say, we shall be compelled to leave the committee of the House of Commons to decide between us. The principle upon which we have framed our bill is that our accounts are to be taken as they stood, and as they were submitted to you up to Midsummer, 1869. We propose to take power to pay a dividend at the rate of 5 per cent. upon the half year then ending, leaving the balance of the revenue account to go towards the liquidation of the defalcation. And so again with regard to the accounts to the 31st of December last, we propose to take a dividend at the rate of 5 per cent., leaving the balance of revenue to go towards the deficiency. Mr. Baxter will now read the bill to you, and I shall then be happy to answer any questions you may desire to put to me.

Mr. BAXTER (parliamentary agent) read and explained the provisions of the bill, an abstract of which has already appeared in our columns.

The CHAIRMAN: I now propose the following resolution:—"That the bill now submitted to the meeting, entitled 'A bill to authorize the Great Central Gas Consumers Company to raise capital for further works, and to provide for the loss occasioned by certain frauds committed upon the company, and for other purposes,' be approved of; and that the directors be authorized to proceed with the same, subject to such alterations as Parliament may think necessary to make therein, and the directors may approve."

Mr. BENNOCH seconded the motion.

Mr. ATTRELL said he was disappointed that no arrangement had been come to with the Board of Trade. He thought it was not worth going to Parliament for so small a sum as £30,000. He had been told that an offer was made to the directors of the Chartered Gas Company to take over the business of the Great Central, and guarantee the shareholders a 7½ preference stock, and, if so, he wished to know why the offer was not accepted. He did not believe that Parliament would allow the directors to raise a single shilling of new capital, and all he could say was that, if he had any voice in the matter, they should go away empty handed.

Mr. BOVILL said he thought it was an outrageous thing for a shareholder to take the part which the last speaker had done, and to talk about opposing his own company.

Mr. ATTRELL wanted to know whether the shareholders were satisfied with the directors for taking £500 a year more remuneration than they were entitled to by Act of Parliament.

The CHAIRMAN said the last speaker must know, as well as every shareholder in the room, that the directors had never taken a halfpenny beyond that which was voted them. He was not disposed to receive Mr. Attrell as an exponent of the Act of Parliament, and should prefer an interpretation from some higher authority. Mr. Attrell spoke as if he were the sole shareholder in the company, and as if those who sat on the directors side of the table having as large, if not a larger stake in the concern, than any other persons, were likely to be more reckless than himself. The directors were not likely to take his opinion as to what was for the interest of the company. Mr. Attrell expressed dissatisfaction because, as he said, what the chairman stated on the last occasion was not now carried out. But the proprietors would do the chairman the justice to remember, he then stated that though the company was never more successfully worked than at the present time, it was necessary to get the sanction of Parliament to the appropriation of a portion of the earnings to the payment of a dividend, otherwise the whole of them would go to the liquidation of the deficiency caused by the defalcation. It was then thought by all that it would be better to get power to pay 5 per cent., leaving 5 per cent. to go towards the liquidation. The raising of the additional capital of £30,000 was not the only object of going for a bill, and every intelligent shareholder must be able to see for himself that there was a sum standing to the credit of the revenue account, about the disposal of which some questions might arise. The proposal of the directors settled all that, and carried the amount to the defalcation account. It provided that up to the last year the whole surplus revenue should go to the liquidation of that unfortunate deficiency, and that after that the balance of the divisible profits up to 10 per cent. (after paying 5 per cent. to the shareholders) should go to the same account. The directors regarded it, and he thought the shareholders generally could not fail to see it in that way, that if they should succeed in getting their bill it would settle a very awkward and troublesome question, and upon a footing which would enable them, within a comparatively short time, to resume payment of a 10 per cent. dividend. With regard to the statement that the directors had been offered a 7½ preference dividend, all he could say was that the offer existed only in the fertile brain of Mr. Attrell. Any proposition of the kind by the Chartered or any other company had never even been whispered to the directors.

A SHAREHOLDER: We do not want it.

The CHAIRMAN: You are right; we do not want it. We want only to be left to ourselves; we have a sound and good concern. I do not mean to tell you that the Chartered Company have not suggested to us an amalgamation in the same way that the City Company are amalgamating with them, in which case we should take what dividend the revenue of the united companies would make; but as to any proposal of a preference or guaranteed dividend, nothing of the sort has ever been hinted at. If any proposition comes from the Chartered Company, we shall not be reluctant to call you together to consider it; but, till that is done, do not be drawn away by idle rumours which are utterly without foundation.

After some few questions had been answered by the CHAIRMAN and Mr. BAXTER, relative to the provisions of the bill, the resolution was put to the meeting, and carried without a dissentient.

A vote of thanks was then passed to the chairman and directors.

The CHAIRMAN, in acknowledging the vote, said: I have only to thank you for receiving us so cordially, and for accepting the explanations I have endeavoured to offer. Your directors have nothing whatever to hide, and nothing to fear. Your concern is certainly doing as prosperously now as it ever was, and we shall endeavour to do our best to struggle through the misfortune which overtook us last year. We have inherent strength to stand alone, and we hope hereafter to pay you again a good dividend.

PARA GAS COMPANY, LIMITED.

An Ordinary General Meeting of the Shareholders (adjourned from the week previous) was held at the Offices, 3, Victoria Chambers, Westminster, on the 7th inst.—WILLIAM CLAY, jun., Esq., in the chair.

The SECRETARY having read the notice convening the meeting, the following report of the directors and statement of accounts were taken as read:—

The directors, in submitting their report to the proprietors, have to announce with deep and sincere regret the death of the late chairman, Sir William Clay, Bart., who, from the formation of the company until his decease in March last, gave his zealous and active exertions on all occasions to promote its welfare and prosperity.

The directors are happy to have it in their power to report very favourably on the state, condition, and prospects of the company, and have much pleasure in submitting the following remarks of the manager:—

"Taking the two half-yearly reports that form the financial year just finished, and "comparing revenue and expenditure with that of the equivalent periods of 1867-8, the "results of the whole year's working become decidedly more marked, and show an "increase of trade, which, if continued, as there is every probability it will be, will in a "few years place the company in a most flourishing and enviable position.

"In short, since my return from England I am more satisfied than ever that, whilst "there is very great foundation for congratulation in the not inconsiderable prosperity "which has already been attained, there is every prospect of its continuing to a still "greater extent."

In accordance with the powers vested in them, and after a most careful consideration of the position of the company, the directors declared an interim dividend at the rate of 5 per cent. per annum on the paid-up capital in June last.

It is gratifying to the directors to be enabled to inform the proprietors that the company's works are in a state of perfect efficiency. In order to keep the labourers near the works, the board sanctioned the erection of dwellings for their accommodation on the land the company acquired last year; beyond this the extensions have been unimportant.

As a result of the war between Brazil and Paraguay, labour became scarce and unsatisfactory, and to meet this difficulty the directors selected six men from Lisbon, who were sent to Pará under contract with the company, and they are glad to say that the conduct of these men has given much satisfaction to the manager.

The two iron lighters which are now, and have been for some time past, in full work, effect a considerable saving to the company, and fully realize the expectations formed of them.

The consumers of gas in Pará have increased in number, and each report received shows that the consumption of gas is steadily advancing; on this head the manager writes:—

"There is an increasing demand for gas in private lighting and illuminations, and also "for coke and tar, which I think will enable us to maintain the price of the former, and "still further increase that of the latter."

The relations between the company and the Government at Pará continue highly satisfactory, and the manager writes:—

"I am happy to be able to inform you that the relations between the Government and "the company continue to be maintained on the same friendly footing as hitherto, and "that the business generally goes on in the regular way in which it was first organized."

Upon a careful comparison of the receipts and expenditure of the company for the half year ending Sept. 30, 1869, the directors recommend a dividend for the present half year at the rate of 8 per cent. per annum, free of income-tax.

The speedy termination of the long war in Paraguay may now be confidently expected; the continuous rise in the rate of exchange gives evidence that this opinion is well founded, and marks the return of commercial prosperity; under these circumstances the directors believe that increased success may be looked for in the current year.

During the past year your manager, Mr. A. F. Wilson, paid a visit to this country for the re-establishment of his health, which had been severely tried by his residence in

Pará. The directors are happy to state that Mr. Wilson was quite successful in his object, and returned to his duties in October last, with his health firmly established. It is satisfactory to learn that all went on well during his temporary absence.

Mr. Wilson's second term of service with the company having expired, the directors have entered into a fresh engagement with him, and they congratulate the proprietors upon the continued connexion with the company of a gentleman so worthy of their esteem and confidence.

The board have, since the last general meeting, in pursuance of the powers conferred on them by the Articles of Association, elected James Temple Bowdoin, Esq., to a seat at the board, to supply the vacancy occasioned by the death of the late Sir William Clay, Bart.

Two of your directors—viz., Joseph Quick, Esq., and James Temple Bowdoin, Esq.—retire by rotation, but are eligible for re-election, and offer themselves accordingly.

Mr. Ernest Oswald Coe and Mr. Joseph Quick, jun., the auditors of the company, retire from office, but are eligible for re-election, and offer themselves accordingly.

Dr. *Balance-Sheet, Sept.* 30, 1869. *Cr.*

To Authorized capital . .		£150,000	0 0	By Works, including extensions, furniture, &c.		£121,022 4 2
Less unissued shares . . .	£10,720			Gas-fitting capital . .		12,472 10 11
Amount on issued shares not called up . .	3,922			Lighter ditto		1,732 14 11
		14,642	0 0	Stock account . . .		461 11 2
		£135,358	0 0	Coals		6,630 10 8
Loans		10,000	0 0	Public lights and residual products . . .		4,930 10 8
Gas-fitting reserve account		1,837	10 5	Sundry debtors . . .		558 17 10
Fire insurance ditto .		40	0 0	Manà and Co., Pará—cash . .	£2,594 4 7	
Liabilities under bills payable		427	14 2	A. F. Wilson—petty do.	98 17 8	
Do. to sundry creditors.		928	9 0	Glyn & Co., London—cash . .	1,432 14 9	
Profit and loss . . .		5,697	18 2	Secretary, London—petty do.	10 4 10	
						4,136 1 10
				Bills of exchange in hand		2,344 9 7
		£154,289	11 9			£154,289 11 9

Dr. *Revenue Account Sept.* 30, 1869. *Cr.*

To Wages, including lamp-lighting, purification, and carbonizing . .		£2,751	10 7	By Balance brought forward.		£4,878 4 3
Coals and wood for carbonizing		7,900	19 11	Public lights		11,430 19 1
Directors attendances and salaries to officers		3,072	15 11	Private ditto		6,061 11 2
Retorts		177	18 7	Meter, &c., rentals . .		742 19 0
Rent and taxes . . .		653	15 0	Public establishments .		581 17 9
Office expenses, stationery, printing, &c. .		151	2 10	Illuminations . . .		650 0 1
Repairs		498	8 6	Tar		329 2 6
Interest		405	14 11	Coke		2,037 18 8
Remittance account. .		305	15 4	Exchange		507 3 11
Apprentices		272	15 2	Lamps		11 5 1
Law expenses (Pará), sundry charges, and travelling expenses .		477	0 9	Gas-fitting revenue. .		791 11 2
Dividends		7,882	17 2	Lighter ditto		788 17 7
Balance carried forward.		5,697	18 2	Undivided profits . .		1,457 2 7
		£30,248	12 10			£30,248 12 10

The CHAIRMAN then said: I now beg to move that the report of the directors be approved and adopted. If there is any gentleman present who wishes to ask questions, now is the time for him to do so. For the board of directors and myself, I can only say that we shall be most happy to afford all the information in our power.

Captain WALROND CLARKE seconded the adoption of the report.

No questions being asked,

The CHAIRMAN said: I will, before making any remarks on that document, briefly allude to the loss which the company have sustained in the decease of our former chairman, although perhaps I am too nearly related to the late Sir William Clay to say much with regard to his worth. Still I think you will all agree with me when I say that we have lost an active and energetic member of the board—one who, in every instance, gave his undivided attention to the welfare of the company, and guided us through the difficulties and dangers which have beset us, especially in our early days. I am sure that you will agree with me in believing that Sir William would have rejoiced at this statement of prosperity which now lies before us. With regard to the report itself, there is very little for me to add to that information of which you are already in possession. Such a state of affairs undoubtedly points to an increase of confidence in Pará. It may be expected, I am glad to say, from all accounts received, that we shall soon see the close of the war in Paraguay, although perhaps it must not be until Lopez meets with a fate which we all think he richly deserves. The end of the war cannot, however, be very far distant, and this opinion is borne out by the recent rise in the rate of exchange. The rate was 17¾d., the par value of which is 27d., and the rate has still further risen to 20½d., a very considerable rise indeed, showing, of course, increased prosperity in Pará. Those paragraphs in the report which are extracted from the statement of our manager are full of hope, and I think we can lay great stress upon them, because Mr. Wilson is a man of sound judgment, and one who is not by any means too sanguine in his predictions. Some time ago his health was very much shaken, and he stood in need of change of climate. In order to re-establish his health, he paid a visit to this country, and those who had heard of him through the medium of his correspondence were exceedingly glad to make his personal acquaintance. This, I am pleased to say, considerably strengthened the opinions which had been already formed of Mr. Wilson, and we have, therefore, every reason to congratulate ourselves on having a manager of his ability to conduct our affairs at Pará. With regard to the erection of houses as residences for our workmen, I may state that the idea was started in order to give them cheaper dwellings, better accommodation for their families, and at the same time to provide for ourselves a constant supply of efficient workmen. This is a very great feature in a place like Pará, as the native labour is not to be relied upon. House-rent at the present time is at such a figure there that, although we shall charge what will be a moderate rent for our houses, we may calculate on having a return of 10 per cent. on the capital expended on the erection of the buildings. I do not know that I have anything more to add, but I need hardly say that the welfare of our property is bound up in the town of Pará; and in order to give you an idea of the future, I should like for a moment to direct your attention to the map before you. The town of Pará, you will perceive, is marked by a large round red spot at the mouth of the Amazon. You will see that the enormous continent of South America in that direction is watered by that great river, which is coloured blue, and I believe I am pretty correct in saying that this district is inexhaustible in its fertility, and that the whole of the products which it opens up must come to Pará, which in future years will be a city of vast importance. I need hardly observe that when it is so, and as we have a concession for 30 years to supply gas, our prosperity must grow with its growth. Having made these few observations, I will now put the motion to the meeting.

The motion was carried unanimously.

Mr. WHITE moved—"That an interim dividend at the rate of 5 per cent. per annum, for the half year ending the 30th of June last, be confirmed, and that a half year's dividend, free of income-tax, up to the 31st of December, at the rate of 8 per cent. per annum, be payable to the shareholders on and after the 10th of February next."

Mr. RIVOLTA seconded the motion, which was carried unanimously.

As two of the directors retired by rotation,

Mr. STERRY moved the re-election of Mr. Joseph Quick, who had been most assiduous in his duties.

Mr. BOWDOIN seconded the motion, which was carried unanimously.

Mr. J. YOUNG next moved the re-election of Mr. James Temple Bowdoin, the other retiring director.

Mr. LAMBERT seconded the resolution, which was carried *nem. con.*

The auditors, Mr. Ernest O. Coe and Mr. Joseph Quick, jun., were re-elected.

Mr. HERVEY then moved a vote of thanks to the chairman for presiding, and in so doing refered to the late Sir William Clay. There was not a shareholder in the company in a better position than he was to speak to the inestimable worth of the deceased, having been associated with them from the formation of their concern. He could bear testimony to the very attentive manner in which Sir William Clay always transacted the business of the company. It was greatly owing to the efforts of Sir William that the shareholders were placed in their present prosperous condition. The manner in which the company had continued to advance year by year must be satisfactory to all present. To those directors, also, who had been associated with him, the thanks of the shareholders were especially due. He did not think he need say anything more in support of his motion, as it was one in which all would agree. He then moved that the best thanks of the meeting be given to the chairman and directors of the company for their efficient services, and that the shareholders desired to record the sincere regret felt by them at the loss they had sustained by the death of their late chairman, Sir William Clay, and to express their recognition of the eminent services rendered by him to the company.

Mr. GODWIN, in seconding the resolution, felt that all the shareholders must be thoroughly satisfied with the conduct of their present chairman and board of directors.

The resolution was then put to the meeting, and carried unanimously.

The CHAIRMAN thanked the shareholders, on behalf of himself and family, for the kind manner in which they had expressed their regret at the loss sustained in the death of his lamented father. On behalf of himself and colleagues at the board, he also thanked the shareholders for their expression of confidence, and he sincerely hoped that nothing would take place in their actions to cause a discontinuance of the same.

The meeting then separated.

AMALGAMATION OF THE CHARTERED AND CITY OF LONDON GASLIGHT AND COKE COMPANIES.

MEETING OF THE CITY OF LONDON GAS COMPANY.

A Special General Meeting of the Proprietors of this Company was held at Radley's Hotel, on Wednesday, December 29, 1869—R. A. GRAY, Esq., in the chair—"to take into consideration the course to be pursued with reference to the resignation of the secretary, and a resolution of the directors consequent thereon; and to consider, and, if approved, to confirm the scheme for the amalgamation of the company with the Gaslight and Coke Company, as settled with the Board of Trade, subject to the approval of an extraordinary general meeting of the company."

The SECRETARY having read the advertisement convening the meeting,

The CHAIRMAN said: Gentlemen, the advertisement just read has informed you of the objects for which we are assembled. It is a matter of deep regret to me that each shareholder is not in possession of the scheme, but the Board of Trade have been altering it from time to time, and it was only last night that we received their answer. It appears to me that this company have been very much and very improperly interfered with; but the Government is all-powerful either for good or for evil, and it would not be advisable for us to set ourselves in opposition to them. Our anxious desire has been to get the Government to make such modifications in the scheme as would protect the interests of this company. If I could be permitted, with a due consideration for the best interests of the company, to do so, I should say at once, "We will have nothing to do with the scheme;" but we are placed in a peculiar position. Amalgamation has been forced upon us, and my own deliberate opinion is that, in the end, the amalgamation will work out beneficially for the interests of this company; but it is for every gentleman present to express an opinion upon it when he hears the scheme submitted to him, and the resolution to be proposed consequent upon that scheme. Of course it is a matter of experiment; but if all the anticipations of the Chartered Company be realized, I think we need not despair or have any doubt that, in a very short time, your dividends will be pretty much what they have been hitherto. But I should be very unwilling to mislead you by saying that they will be kept up to that immediately. There are many things to be done, but we believe it will work right in the end. But whether that be so or not, we had no alternative than to endeavour to comply with the plan of the Government. No doubt they will force other companies into the same arrangement—at all events it is very probable they will. We have hitherto gone on very advantageously, and I hope we shall continue to do so. I have had the honour of presiding over you for a great many years, and I have been a director of the company ever since 1829. Of course, to a certain extent, my power will now cease; but, while I am upon that subject, it is due to the Chartered Gas Company, who claim to be the first company that introduced gas lighting, to say that they have pressed upon me to accept the office of chairman of the united companies. It was a concession on their part that I had no reason to expect, and I feel much flattered by it. But, owing a deep debt of obligation to my worthy friends the proprietors of this company, it would be very far from my desire to take upon myself a responsibility and duty unless I felt myself equal to the undertaking. That has decided me not to accept the chairmanship of the united companies, assuming that the amalgamation goes on. The Board of Trade have certainly tried us in different ways, and you may suppose that our negotiations have been of a very anxious character. In the proposals we made we thought we had conceded everything that they asked. What we most insisted upon was that the company should have full compensation for any injury inflicted upon them by the Metropolitan District Railway or the Metropolitan Board of Works. When those schemes were first propounded ample provision was made for our protection. They consented that there should be two archways of 70 feet span, and an intervening space to enable the lighters to come alongside our wharf to unload coal. A little time after that they applied for an Act of Parliament to allow them to make a solid embankment. We had no power to prevent it, but there was the same clause introduced into that Act of Parliament which had been introduced into the first, giving the company compensation for any injury either from the one body or the other, against whom we could make claim. Representations, however, have been made to the Board of Trade on the subject, and the Board of Trade have assented to them. Our solicitor will read to you the scheme by-and-by, as our object is to give the shareholders the fullest information in reference to it. It would be unbecoming in the directors, who have hitherto conducted the affairs of the company to the satisfaction of the proprietors, and I hope to their interests, to withhold anything from you. When you have heard the scheme read you will then give us instructions whether it is expedient to go on with the amalgamation or to let it fall through. My own view is that we should assent to the amalgamation. All the directors are very large shareholders, and you may easily suppose that, self-interest guiding a man, he will not recommend that which would not be of service to himself. I shall be quite ready to answer any questions put to me, and no doubt the meeting will be conducted with great kindness and harmony. I will further add the assurance that, whatever be your determination, you will have our best assistance at all times and on all occasions. But, gentlemen, before the scheme is laid before you I have a resolution to submit to the meeting, and it is one which could not be brought for-

ward at any other time. There is in the scheme of amalgamation a provision made for the pensioning of those officers with whose services we shall be compelled to dispense; but there is one officer who has very long and very faithfully served us, and that officer stands in a very different position to any other. I refer to our secretary, Mr. Millar, who has been in our service for nearly fifty years. What would be a proper compensation for a person in the full vigour of life—say at 25 years of age—would be a very inadequate compensation to a person who has faithfully served us for half a century. I believe every proprietor present who has had the opportunity of intercourse with Mr. Millar will say that no man ever occupied a position of responsibility more courteously and kindly to the proprietors than he has done. The resolution which I am going to read to you has been passed by the directors, subject to your confirmation—"Resolved, that, having regard to the fact that Mr. Millar will in July next complete fifty years in the service of the company, during which period he has performed the duties of the various offices filled by him with zeal and ability, and with entire satisfaction to the directors, the directors are of opinion he should be allowed to retire on the full salary he now enjoys, and that if this resolution be confirmed by the extraordinary general meeting of the shareholders, his resignation shall be accepted." The resolution I have to submit for your adoption is this—"That the resolution of the directors, passed at their meeting on the 10th inst., with reference to the retirement of the secretary, be and the same is hereby confirmed, and that the directors, when accepting the resignation of the secretary, do provide for his receiving, as a retiring pension, the full amount of his annual salary."

Mr. HADLAND: I beg leave to second it.

A PROPRIETOR: What is the salary of the secretary?

The CHAIRMAN: £700 a year.

Mr. WALMISLEY: I do not think there is a single man in the room who would not confirm all that you have said, sir, with regard to Mr. Millar. His urbanity and kindness are not to be surpassed; his attention to the business of the company has been great, and I think he truly merits his full pay. I am very much surprised to hear that his salary is only £700 a year, having been fully under the impression that it was at least £1000 or £1100. I am quite sure that the proprietors will be unanimous in carrying this resolution, whatever difference of opinion may arise with reference to the next.

Mr. WEST: Does it not seem a little premature to decide this matter before we hear the scheme of the amalgamation read?

Mr. WARD: It is necessary that this should be done first, if the shareholders have that kindly feeling towards the secretary which we believe they have, because after the scheme for the amalgamation is approved the matter will go out of the hands of the directors and shareholders. The chairman has presumed that there was a very kindly feeling towards Mr. Millar, and that, after his long and faithful services for a period of fifty years, the shareholders would not like the question of his retiring pension to go out of their hands.

Mr. LAVANCHY: We are much indebted to Mr. Ward for giving us the point of law, and I have no hesitation in saying that the proposition now before the meeting is not premature in the least. We are now in possession of our own property, but the moment we assent to the amalgamation with another company we shall have to ask their sanction to such a proceeding as this. As to the value of Mr. Millar's services there cannot for a moment be a question.

Mr. WEST: Not at all.

The resolution was then put to the meeting, and carried unanimously.

The CHAIRMAN (addressing the secretary, who, having been absent during the conversation, now entered the room) said: Mr. Millar, I am sure it will be very gratifying to you to learn from me that, upon the resolution which I submitted to the meeting, there has been but one opinion, and that towards yourself the only expression of feeling has been that of kindness, and a hearty acknowledgment of the courteous and judicious conduct pursued by you during the long period of your service with the company, and in all the intercourse the shareholders have had with you. I have much pleasure in informing you that the resolution to continue your salary has been passed unanimously.

Mr. MILLAR, on rising to acknowledge the vote, was received with cheers. He said: Mr. Chairman and gentlemen, to receive such an expression of your kindness and consideration, after a servitude of fifty years, I need not say is peculiarly gratifying. To yourself, Mr. Chairman, and the members of the board, I beg to express my deep sense of the courtesy I have always received from you, and to thank you for the confidence which for so many years you have placed in me. There are several shareholders present whom I have known for a long period of time, and during the whole of my intercourse with them I have been treated with the utmost courtesy and kindness. I hope they feel that I have been anxious to deserve it, and for the proof they have given me to-day of their esteem and approval, I beg in these few words most heartily to thank them, and to say that, in the transition of your company, and in its future history, as my home will in all probability be near London, they may command my services in any way that may be useful, either night or day. Gentlemen, I again thank you.

Mr. LAYTON (the company's solicitor) then read the clauses of the amalgamation scheme, as altered and approved by the Board of Trade.

By the first clause it is provided that the scheme shall come into operation on the 1st of January, 1870. Clauses 2 to 15 are formal provisions for carrying out the amalgamation. From and after the commencement of the scheme the companies cease to exist as separate companies, and their respective undertakings are to form part of one and the same undertaking. The united company is incorporated under the name of "The Gaslight and Coke Company," and all the lands, works, and properties of the two companies are vested in them Existing contracts are preserved; sales of shares remain in force; mortgages and bonds are made a charge on the united undertaking, with priority on the amalgamated undertakings respectively. Debts due, and rates, rents, and charges payable to the amalgamating companies are to be paid to the united company; resolutions of both companies to be as far as applicable binding upon, and books, accounts, and documents of each to be evidence for or against the united company in respect of any matter in which they would have been evidence for or against either company; actions are not to abate; registers of shares, &c., are to be valid till new or altered registers, &c., are substituted; officers of both companies are to be considered officers of the united company till removed, and their respective sureties are to be liable to the united company, and there is a general saving of rights and claims under the Acts of the two companies. Clauses 16 to 36 relate to the constitution and regulation of the united company. The capital is to be £1,950,000 (being the aggregate authorized capitals of the two companies previously to the commencement of the scheme) divided into 195,000 shares of £10 each, whereof 185,000 are to be designated as A shares, and the remaining 10,000, representing the sum of £100,000, are to be designated B shares. The shares are to be appropriated as follows:—"Every shareholder in the Gaslight and Coke Company shall, in respect of every fully paid-up share belonging to him in such company, be entitled to, and shall be registered as the holder of five A shares in the united company, fully paid up; in respect of every share belonging to him in the Gaslight and Coke Company, on which forty-five pounds has been paid up, be entitled to, and shall be registered as the holder of four A shares in the united company, fully paid up, and one A share in such company, with five pounds paid up thereon; every shareholder in the City of London Gaslight and Coke Company shall, in respect of every A share belonging to him in such company, be entitled to, and be registered as the holder of two A shares in the united company, fully paid up; in respect of every B share belonging to him in the said City of London Gaslight and Coke Company, he shall be entitled to, and be registered as, the holder of one B share in the united company, fully paid up; in respect of every fully paid-up 'new share,' belonging to him in the City of London Gaslight and Coke Company, he shall be entitled to, and shall be registered as the holder of one A share in the united company, fully paid up; and in respect of every 'new share' belonging to him in the City of London Gaslight and Coke Company not fully paid up, he shall be entitled to and shall be registered as the holder of one A share in the united company, with five pounds paid up thereon. The holder of any share in the Gaslight and Coke Company, in respect of which forty-five pounds per share has been paid, and the holder of any 'new share' in the City of London Gaslight and Coke Company, on which five pounds has been paid, shall, respectively, be liable to calls in respect of each such share to the same extent, and payment of the same may be enforced by the united company in the same manner as if this scheme had not been confirmed." With reference to the borrowing powers of the united company, it is provided that "any powers of borrowing which might have been exercised by either of the amalgamating companies if this scheme had not been confirmed, may be exercised by the united company in the same manner and to the same extent as the same might have been exercised by such amalgamating company if this scheme had not been confirmed; and all mortgages and bonds issued after the commencement of this scheme by the united company, whether by renewal of previous mortgages and bonds or otherwise, shall be issued by and in the name of the united company, and shall be a charge upon the united undertaking, without any priority (*inter se*) on account of date of creation or otherwise." By clause 22 provision is made for arranging the revenue accounts of the two companies respectively at the time of the amalgamation. The directors of each company in office at the commencement of the scheme are to be the first directors of the united company, and by resolution at any time the number of directors may be reduced to nine. Until that is done no vacancies at the board are to be filled up, and from the time that the number is so reduced they are not to exceed nine nor be less than five. The remuneration of the directors during the first year is to be £4500, and a reduction is to be annually made in such remuneration until, in the ninth and subsequent years, it is to be £3000. The present auditors are to continue in office for one year, after which the number is to be reduced to three, and is never to be less than two. The remuneration to the auditors is not to exceed £50 each per annum, and either of the present auditors who is not elected at the end of the first year an auditor of the united company is to be entitled to a gratuity not exceeding a year's salary, if voted by the company. Compensation to salaried officers who have been in the employ of either company for ten years and more, and whose office or employment is abolished or dispensed with in consequence of this scheme, are to be paid an annuity for life equal, if they have been 25 years or more in the service, of either of the companies, to two-thirds of their annual emolument; and with respect to persons who have been less than 25 years in the companies service, this rate of annuity is to be diminished by one twenty-fifth part for every year. With the consent of the company, the annuity may be compounded for by payment of a sufficient sum to purchase a like annuity at the Post-Office. The company may pay a sum equal to one year's emolument to any salaried officer not entitled to an annuity, and in every case, with the special sanction of the Board of Trade, the annuity or sum of money may be increased in the case of any officer who has rendered special services to either of the amalgamating companies. The company may pay a gratuity not exceeding three months pay to any weekly servant whose services are dispensed with. The company are empowered from time to time to sell and dispose of surplus lands and plant, and the proceeds of any such sale, and any other sums not received on revenue account, are to be applied only to the purpose to which capital is properly applicable, unless otherwise directed by any special Act, and till so applied the money is to be invested, and the interest carried to the credit of revenue. The capital which the company may have power to issue is to be deemed to be reduced by the amount of such proceeds or other sums. By the 32nd clause—"The Board of Trade may at any time after the expiration of two years from the completion of the works of the Gaslight and Coke Company at Beckton, near Barking, give notice to the united company that they require them to cease altogether the manufacture of gas in the City of London; and at any time after the expiration of five years from the completion of such works the Board of Trade may give notice to the united company that they require them to cease the storeage of gas in the City of London; and after the expiration of six months from the date of any such notice, or of such longer period as may be specified therein, it shall not be lawful for the united company to manufacture gas in the City of London, if such notice be given with respect to such manufacture, nor to store gas in the City of London, if such notice be given with respect to such storeage, unless the Board of Trade see fit to extend the time during which such manufacture or storeage is to continue." By the 33rd clause it is provided that—"Any compensation which may become payable to either of the amalgamating companies, or the united company, in respect of interference with or damage to the works, property, or undertaking of either of the amalgamating companies, or of the united company, shall be applied in the same manner as the proceeds of sales are directed to be applied in the 31st section of this scheme: provided, that this section shall not apply to such money, if any, as may become payable annually to the City of London Gaslight and Coke Company, or to the united company, in respect of the increased cost of the delivery of coal or coke, or other material, to or by the said gas company, which money shall be carried to revenue account." These two clauses were not in the scheme as originally drawn, but were inserted by the Board of Trade.

Mr. WARD: I should say, gentlemen, with regard to those clauses which relate to the manufacture and storeage of gas at Blackfriars, that the scheme, as originally prepared by our company and by the Chartered Company, made no provision for any such cessation. These provisions were inserted by the Board of Trade, very much, I think, at the instigation of the Corporation of London and the Metropolitan Board of Works. Of course it is the object and desire of companies holding a position such as this company does rather to work with the authorities than against them, and, if they can possibly do anything which is favourable to the views of the authorities, to do it, making, of course, due provision to maintain their own rights and privileges. Therefore, when these clauses were inserted in the scheme, the directors thought it was necessary and proper that some sort of provision should be made for the compensation to be received by us, after our river frontage had been cut off by the embankment and the railway. Clauses were accordingly prepared to carry that object into effect, and the Board of Trade seemed to think they were reasonable and proper clauses. But some gentlemen in Spring Gardens had a notion that, by excluding these clauses, they would escape from the consequences of any injury we might sustain. We wish, of course, to preserve our rights against the Metropolitan Board, but from some representations made by them the scheme was sent down to us from the Board of Trade with all the sections protecting us and our compensation struck out. The matter still remains in dispute with us; and the chairman, I think, has a resolution which he will propose to you, which, expressing your approval of the other portions of the scheme, will affirm that your rights to compensation should remain unaffected.

A PROPRIETOR: I see that the capital is stated to be £1,950,000. Does it mean that the two capitals added together will be £1,950,000? Assuming that the new shares of the Chartered Company are paid up in full, will there be a margin? The importance of that is that, if there is a margin, supposing this amalgamation is a success, it will be of great value to us if we can issue new shares for new works without going to Parliament. Another point I wish to be informed upon is this: In April of this year the report presented at the meet-

ing of the London Gas Company stated that "the loss arising from leakage of gas is a matter which has constantly occupied the attention of your directors, and although this has been greatly diminished, it is an object still in view, and they continue to seek its still further reduction by increasing the capacity of the mains as occasion requires;" and the chairman told us that originally on the mains of that company the leakage actually amounted to 40 per cent., but that it was now reduced to 14. Even 14 per cent. is a large amount. It is an important consideration for us in this way: We are going to join a company which has miles of mains before it reaches London, and the leakage may be very great. You may, perhaps, have made inquiries of the engineers, and know whether, in the jointing of those mains, they may be able to adopt means for keeping down the leakage. It was stated, at a meeting of gas engineers this year, that the loss by leakage of gas in the metropolis was equal to £100,000 per annum. I am told that, with reference to the new works of the Chartered Company, there can be no two opinions as to the way in which they are being carried out; still, as the leakage on those miles of main may be something enormous, it will be satisfactory if you can give us some assurance upon the subject.

The CHAIRMAN: There is a great difference of opinion with respect to leakage. My own opinion with reference to the mains referred to—and I am fortified in this by the opinion of engineers—is, that it will not exceed 2 per cent. My friend who has just spoken must be under some misapprehension as to what was stated at the London Gas Company's meeting. Many years ago I was connected with that company, and I know that it was then never more than 24 or 25 per cent.

Mr. WHITE: The £10 C shares are, I believe, partly paid up—£5 paid. I happen to hold some shares of both sorts, and I think I understood the solicitor to read that for these shares we were to have one new share.

The SECRETARY: No; one £10 share endorsed £5 paid.

Mr. WHITE: I have paid up the full amount; will the second £5 be capitalized?

The SECRETARY: No; not till called up.

The CHAIRMAN: With respect to the inquiry made by an honourable proprietor, the total capital will be £1,950,000, and my own opinion is that this capital will be ample for half a century to come.

Mr. WARD: Supposing all the Chartered Company's new shares are paid up, there will be a margin of about £364,000, speaking in general terms.

The CHAIRMAN: You know the Chartered Company have a very admirable site for their works—perhaps no better site could possibly be had. They have 150 acres of land, and with the progress of building operations the probability is that, after appropriating to their own use all they require, they will realize a very handsome profit by disposing of the remainder.

Mr. WARD: With regard to leakage, no doubt the per centage would be larger with the London Gas Company, on account of the smallness of their pipes originally. The mains which the Chartered Company are laying from Beckton, are, I suppose, without exception, the largest in England, and in laying such mains the joints are all tested as they proceed, so that any defects are at once discovered; and then these mains are very differently situated to those which are laid in crowded streets where the traffic is very heavy.

Mr. STOKES: I do not quite understand the allotment of the shares, and shall be glad if the solicitor will explain it a little more in detail. I want also to inquire what prospect there is of selling coke and other products at Beckton. Being so far from London, I suppose the sale will not be so good as though it was close.

The CHAIRMAN: We have been given to understand that there will be a very advantageous sale of coke down there, because the works are open to the river, and the barges have easy access to them.

Mr. WARD: In addition to that there is a tramway belonging to the company in connexion with the works, which extends to a rather thickly populated district.

A PROPRIETOR: Allusion is made in the scheme to the sale of buildings and lands, but it occurs to me that you have not provided for letting if you cannot sell.

Mr. LAYTON (in reply to Mr. Stokes): The Chartered shares are £50. The holders of these will receive for each five £10 shares of the united companies. The City Company's shares are £20 each, and the holders of these will be entitled to two £10 shares for each one.

Mr. STOKES: Those have to be allotted still.

Mr. HADLAND: No; it is in exchange for the existing shares.

The CHAIRMAN: Their shares are £50, ours are £20; therefore you will have two £10 shares and they five in exchange, which will be equivalent.

A PROPRIETOR: I had intended to ask you whether we could not have a copy of the scheme sent round to the shareholders.

Mr. LYNN: Do I understand that every holder of a £20 share will have three £10 shares?

The SECRETARY: No; if you are the holder of ten £20 shares in the City Company, you will receive twenty £10 shares in the new concern.

Mr. STOKES: It will be the same amount only divided into smaller sums?

The CHAIRMAN: Yes; you will have an equivalent.

Mr. STOKES: You are not going to issue any more shares?

The CHAIRMAN: No.

Mr. PHILLIPS: One of the clauses which the solicitor read mentioned the debts of the companies respectively. Mr. Ward, speaking of the assets, said that there would be a good deal of give and take. I should like to know whether the debts will be similarly dealt with.

Mr. WARD: You mean, supposing at the commencement of the amalgamation, who is to pay? We have to pay our own debts, and they theirs. The debts are all taken out before making the dividend for the half year, and the balance, after this is done, is taken over to the revenue of the amalgamated companies.

Mr. WALMISLEY: But the dividend of the Chartered Company is only 4 per cent.

Mr. WARD: No; 7½ per cent. last time.

The CHAIRMAN: The resolution I have to submit to you is the following:—"Resolved, that an amalgamation of the City of London Gaslight and Coke Company with the Gaslight and Coke Company be approved, and that the scheme of amalgamation as now printed be approved, confirmed, and adopted, subject to the insertion therein of the following clause—viz.: 'Nothing herein contained shall alter or affect, or be held or construed to alter or affect, any or either of the provisions with reference to the City of London Gaslight and Coke Company, and their undertaking, which are contained in the Thames Embankment Act, 1862; the Metropolitan District Railway Act, 1864; and The Metropolitan District Railway Act, 1868, or either of them; nor shall anything herein contained take away, lessen, interfere with, or prejudicially affect any of the rights, remedies, powers, claims, and demands which by the said Acts, or either of them, were vested in or acquired by the City of London Gaslight and Coke Company.'" This will preserve our rights under the different Acts of Parliament. The Board of Works are very desirous to get rid of us altogether, but it would be a great injustice, after having given our consent to the embankment being formed, that the clauses introduced by Parliament for our protection should be virtually got rid of. We feel that we have a right to insist upon their observance, and it is upon that principle we mean to act. If they negative this proviso, of course the scheme is at an end; but I have no doubt the Board of Trade will see the justice of our position, and, after a little consideration, will assent.

Mr. WARD: If the scheme is not at an end, at all events we must call you together again.

Mr. HADLAND: I beg to second the resolution.

The CHAIRMAN: I have read this as the resolution, and, as I said before, I hope we shall be pleased and satisfied with the result.

Mr. WHITE: If you get compensation, to whom will it go?

The CHAIRMAN: We shall all get the benefit of it. The realization of the property will prevent the necessity for calling up so much capital.

The SECRETARY: The proceeds are to be applied in paying off the borrowed moneys.

Mr. RICE: Would you, sir, recommend this scheme yourself?

The CHAIRMAN: I have already said that if we could have our choice we should not desire such a thing. I wish we were otherwise circumstanced, and I think that is the opinion of the other directors.

Mr. LAVANCHY: I certainly endorse what the chairman said at the opening of the meeting, and wish we could have had a copy of the scheme sent to us before the meeting, because, however intelligent shareholders may be, the mind cannot grasp the full purport of the clauses as they are read over. But we can understand and appreciate the integrity, and honesty, and good intent of the directors; and coming, as this scheme does, with the unanimous recommendation of the board, in whom we have unlimited confidence, we must accept it. We have a guarantee in their past management of our affairs, that if they did not in their hearts believe it would be of advantage to us, they would not submit it and endorse it with the expression of their approval. On this ground I feel much pleasure in supporting the resolution read by our excellent chairman. I regret very much that he will not much longer preside over us, but we shall have his presence and countenance, and that will cheer us in all we do.

Mr. WARD: I can bear testimony to the earnest desire and efforts of the directors and officers of this company and of the Chartered Company that the scheme should be in the hands of the proprietors before they were called upon to sanction it; but we were prevented carrying out that desire by circumstances which we could not control.

Mr. WHITE: Are we to consider this meeting as final?

The CHAIRMAN: The resolution protects us to this extent—it adopts the scheme if our Acts of Parliament are not interfered with, so that you may with great confidence agree to it.

The SECRETARY: So anxious were the board that the scheme should be in the hands of the proprietors before this meeting, that I have for some days had the circulars ready printed, and on my desk, which were to accompany the copies, waiting the receipt of them from the Board of Trade.

Mr. WHITE: There will not be another meeting to confirm this scheme?

The SECRETAY: No.

Mr. WALMISLEY: Provided this clause insterted.

The CHAIRMAN: I may state that the scheme has been before the Board of Trade ever since October last.

A PROPRIETOR: Will a copy be sent round to the shareholders?

The CHAIRMAN: Yes, when complete.

The resolution was then put, and carried unanimously.

The CHAIRMAN: Gentlemen, I thank you for your attendance, and I hope everything will work to your satisfaction. Of one thing I can assure you, and that is, that everything I and my friends can do to promote your welfare and prosperity will be cheerfully done by us.

On the motion of Mr. PHILLIPS, seconded by Mr. WEST, a cordial vote of thanks was given to the chairman and directors for their zealous and constant regard for the interests of the shareholders.

The CHAIRMAN: Gentlemen, it is very gratifying to my feelings to receive this mark of your confidence. You know I must look upon this as my dying speech. (No, no.) Well, all I can say is that, so long as Providence may spare my life and spare my energies, they will be occupied in proving that I am not undeserving the confidence of my friends which I have hitherto enjoyed. In the amalgamated companies I believe we shall be associated with gentlemen with whom it will be gratifying to work; that we shall act together harmoniously, and, as I hope, to the satisfaction of the proprietors generally. Numerically we are not so strong as they are, but I know they will be actuated by a good spirit towards us. Indeed, they could not give a better proof of that than by their offering me the position of chairman. That speaks for itself, and shows there is a most harmonious feeling existing between us, and from which a very favourable augury may be drawn for the future.

On the motion of Mr. WHITE, seconded by Mr. RICE, a vote of thanks was given to the secretary; and Mr. MILLAR having appropriately replied, the proceedings terminated.

MEETING OF THE CHARTERED GAS COMPANY.

A Special General Meeting of the Shareholders of this Company was held at the Offices, Horseferry Road, Westminster, on Friday, Dec. 31, 1869—SIMON ADAMS BECK, Esq., the governor, in the chair—to receive and consider the scheme, approved by the Board of Trade, for the amalgamation with this company of the City of London Gaslight and Coke Company.

The SECRETARY (Mr. J. O. Phillips) having read the advertisement convening the meeting,

The GOVERNOR said: Gentlemen, the advertisement tells you upon what occasion you are called here to-day. I think we all agree so much in the advantages which will be derived from the amalgamation—not only to this company, but also to the City Company—that there can hardly be a question about your adoption of the resolution which is to be proposed to you. We should have sent you a copy of the scheme some days since, but, unfortunately, a trifling question arose with the Board of Trade as to the rights of the City Gas Company, and the Christmas holidays intervening, prevented our obtaining a definite answer from the board on the subject. The City Company had a meeting on Wednesday, at which they adopted the scheme of amalgamation, subject to a clause which is now before the Board of Trade, and we propose to ask your assent to a resolution precisely in the same form, for until the matter with the Board is finally settled we cannot say that the amalgamation is conclusively decided on. We hope it will be so, but we only ask you to-day to adopt a resolution approving the scheme, subject to that proviso. As I said before, we are all agreed that the amalgamation will be of advantage to both companies, while it carries into operation the views so often expressed by Parliament on this point. When we consider the reduced price which we shall receive for our gas after this year, and the increased illuminating power we shall have to give the public, we must see at once that the only way to maintain our position is by the reduction of our expenses, and the most rigid economy in every department. In this respect the amalgamation will be of material advantage to us. I believe when we open our new works at Barking we shall be able to save many thousands a year in the cost of our coals; in addition to that, we shall work with less leakage throughout our district, and generally our expenses of manufacture will be less. Independently of these advantages, when the works at Barking are complete, we shall be able to sell a great portion, if not the whole, of the stations in the City and adjoining, which will, of course, recoup some of the capital expended. With these few observations I call upon you to support the resolution which will now be submitted to you, when the secretary has read over the heads of the scheme.

The SECRETARY read the scheme, an abstract of which is given in the report of the City Gas Company's meeting.

The GOVERNOR: The scheme just read is in the form approved by the Board of Trade, and the clause which the City Gas Company wish to have inserted is

to the following effect:—"Nothing herein contained shall alter or affect, or be held or construed to alter or affect, any or either of the provisions with reference to the City of London Gaslight and Coke Company, and their undertaking, which are contained in the Thames Embankment Act, 1862; the Metropolitan District Railway Act, 1864; and the Metropolitan District Railway Act, 1868, or either of them; nor shall anything herein contained take away, lessen, interfere with, or prejudicially affect any of the rights, remedies, powers, claims, and demands which by the said Acts, or either of them, were vested in or acquired by the City of London Gaslight and Coke Company.'" We propose, also, to take your resolution approving of this scheme, subject to this proviso being inserted. The City Company think there should be no doubt as to their title to compensation, notwithstanding this scheme is entered into. The Board of Trade thought the clause had been introduced as an afterthought, and I believe that is the chief reason why they hesitated to accept it. But we have shown them that it was no afterthought at all; that all the clauses doing away with the manufacture and storeage of gas in the City were introduced by them, and were not in our original scheme; and it was the insertion of these clauses that called forth the provisoes for safety on our part. The directors of this company see no objection to this proviso, and they call upon you to adopt the scheme, subject to its insertion.

Mr. MAUGHAN: What becomes of it if the Board of Trade will not assent?

The GOVERNOR: We shall have to call you together again.

Mr. MAUGHAN: Is the clause of so much value?

Mr. GRAY: Yes, we consider it to be so. In all our negotiations with the Board of Trade, we told them explicitly that we could not consent to an amalgamation, unless the compensation to which we were entitled, under the different Acts of Parliament, was secured to us. It is known to many persons present that, when the Thames Embankment Bill was before the Legislature, provision was made that we should have free access from the river to our works, by means of arches of 70 feet span. We were perfectly satisfied with that, and had no desire whatever to throw an impediment in the way of such a great undertaking. Subsequently it was considered more advisable that there should be a solid embankment in front of our works, but we were not aware of the fact until some progress had been made in the matter in the House of Commons. So soon as it came to our knowledge, we represented our case to the authorities, and due provision was made for giving us proper facilities in carrying on our business, with which we were satisfied. Afterwards, the Metropolitan Board and the Metropolitan District Railway Company, and, I believe, the corporation, used every effort in their power to induce the Board of Trade to throw us overboard; but in my interviews with the Board of Trade I have constantly pointed out that nothing could be more unjust. We merely seek compensation for the loss we have sustained through the carrying out of a great public improvement, and I ask what would the Marquis of Westminster, or any other person having a large landed interest, expect if he were called upon to give up a portion of his property for the public advantage? Would he not consider it very unjust that the public should be benefited at his expense? Certainly he would. And I feel that we should be doing a great injustice to our proprietors if we allowed the progress of a public improvement to materially damage those interests which we are bound to protect, and which interests have been recognized by the Legislature. I feel sure that the claim is so just that the Government cannot resist it. They are trying to reconcile conflicting interests, but of one thing I am quite certain, that they will never call upon us to surrender our property without any return.

The GOVERNOR: I now move—"That this resolution, coupled with the scheme of amalgamation, be assented to."

The DEPUTY-GOVERNOR (the Hon. Howe Browne): I beg leave to second the motion.

After some remarks from Mr. WARD,

The resolution was put, and carried unanimously.

The GOVERNOR: Now, gentlemen, the only other matter I have to bring before you is one which is somewhat personal to myself, but I am sure you will all feel gratified when I mention it. At the time this amalgamation was originally talked about I thought there might be some question as to the chairmanship of the united companies. Knowing the great energy which Mr. Gray had always shown as chairman of the City Company, and considering his years, I felt it would be a graceful act on my part at once to say that there would be no obstacle, so far as I was concerned, to his occupying this chair. I was fully prepared, when the amalgamation was closed, to carry out my view; but Mr. Gray very kindly said that he could not think of displacing me as chairman of the united companies, and waived his claim entirely to the honour. The directors of this company felt it right to recognize and mark their sense of his conduct on that occasion by passing the following resolution:—"Resolved, that this court entertain a high sense of the honourable and straightforward conduct of Robert Alexander Gray, Esq., the chairman of the City of London Gas Company, in all matters affecting the interests of the two companies. It appreciates his kindness in waiving his claim to the chairmanship of the united companies, and desires to express to him the respect and esteem of every member of this court." I only mention this to you to show the harmonious feeling with which we have carried out the details of this matter. (Cheers.)

A SHAREHOLDER: You have not told us the name of the new company.

The GOVERNOR: We retain our own name.

Mr. MAUGHAN: There was one thing which struck me when the scheme was being read, and that was the small amount of compensation to be paid to the retiring auditors—£50.

The GOVERNOR: It is one year's remuneration.

Mr. MAUGHAN: It is ridiculously small.

The GOVERNOR: The Board of Trade would not give more.

The SECRETARY: At present there are three auditors of the Chartered, and two of the City Company. The continuance of five would be an absurdity; but it is proposed to retain the whole of them for one year, and then to ballot out two. As the remuneration of the auditors now is very insufficient for the amount of work they do, so the compensation to those who retire is very small.

The GOVERNOR: The Board of Trade wanted to cut the number of auditors down to two, and to give no compensation. You will be pleased to learn that since our last general meeting the question of the raising of our new capital has been practically decided. There were several objections to the mode proposed of raising the money, but I have great pleasure in telling you that the operation has been most successful. We have raised every shilling of the money, and have had applications for thousands of shares beyond what we required to issue, while the parties who have taken shares have paid up in full more than one-half of the capital required. They were all shareholders to whom the new capital was offered, and there has not been the slightest complaint or difficulty in any way. It is to us most gratifying, because it shows the credit we are in, and I may tell you that already the shares are at a premium.

Mr. GRAY: Gentlemen, you may well suppose that the resolution to which the board of this company have come is one which is highly gratifying to my feelings. For a great number of years my intercourse, as chairman of the City Company, with the directors of your company, has been of the most friendly character. During a long period I do not think there has been any difference of opinion between us; and when the plan for an amalgamation was suggested, I told Mr. Beck, as he has stated to you, that if it were a question as to who should preside over the united companies, I had no objection to waive my claims in his favour. At the time I did so, I did not at all anticipate anything of the sort; but still I feel deeply indebted to him for the concession he made towards me. Of course, I do not lose sight of one thing—that the Chartered Company was established for some years before my company was incorporated. My worthy friend has very truly stated to you that I have for a very long period been associated with the management of my company, and I believe all those who have had the opportunity of knowing me will bear their testimony to the earnest desire I have always manifested to do my duty. I sincerely trust—and upon this point I entertain no doubt—that the amalgamated companies will go on in the same sort of harmony that has marked our proceedings hitherto, and I do firmly believe that in the end the amalgamation will be highly beneficial to all the proprietors. Of one thing I can assure you—that I, with those worthy friends with whom I shall be associated, enter upon the duties which will devolve upon us with the sincere and hearty desire to promote, in the most effectual manner, the success of the united undertakings. And I may be permitted to say that I am highly pleased to see my esteemed friend, Mr. Beck, occupying the position of chairman of the united companies, and can promise that no jealousy will ever exist between us. He has made a concession to me which is highly gratifying to my feelings; but it would have been a piece of arrant presumption in me, at my time of life, to take so prominent a position as my good friend was disposed to assign to me. I thank you all for the very complimentary manner in which the communication of the resolution of the directors has been received, and I hope we may hereafter have abundant cause to congratulate ourselves upon the continued success of our undertaking.

Mr. PRICE: Is there not a subsequent clause in the scheme to that which Mr. Maughan referred to, about the remuneration to retiring officers; and would not that apply to the auditors?

The GOVERNOR: No.

Mr. PRICE: This clause is a great improvement upon the one which the Board of Trade put in.

Mr. YOOL: As the only auditor present, I may perhaps be allowed to say on this subject that my view is that the auditors are made for the company and not the company for the auditors, and as it is for the benefit of the company that the services of some of us should be dispensed with, we are satisfied.

Mr. WARD: I think there is one duty we have to perform before leaving this room, and that is to recognize the services of the governor and directors in conducting this arduous negotiation with the Board of Trade, and bringing it, as we have reason to hope, to a successful issue. I beg that you will join me in tendering to them a vote of thanks on this occasion.

Mr. HADLAND: I second the resolution most cordially.

The vote was unanimously adopted.

The GOVERNOR: On behalf of myself and my brother directors I can only again thank you for the honour you have done us. It is the more gratifying on the present occasion, because the resolution was submitted by a gentleman who has been in communication with us constantly on the subject of the amalgamation. Those communications might have been of a less friendly character, but they have been carried on in the most courteous and satisfactory manner, and I trust that in the result they will prove to be for the general advantage of the united companies.

MUNICIPAL ABUSES AT CARLISLE.

Perhaps it may be convenient to note now one or two suggestions on our municipal affairs, which must have occurred to all who have followed the long, but by no means tedious or uninstructive, discussion on what Lord Derby would have called the "muddle" at the gas-works. All who have had any experience of public affairs know how committees are worked. It is never expected that every member of a committee will make himself personally conversant with the details of the business referred to him, and as a matter of fact and of practice he does not. A limited number come to the front and take the lead. One man commands confidence by the natural superiority of his judgment; another by mere force of character pushes himself into a prominent place; a third, by virtue of his social standing, secures the deference of those about him; while a fourth, by diligent attendance and unceasing attention to minor details, obtains the credit of "knowing all about it," and thus gains more influence than perhaps his wisdom entitles him to. These men really manage everything in their own way. Upon them the "residuum" pin their faith; their judgment guides the rest; their word is law, and their decisions are backed up with an unfaltering and impenetrable *esprit de corps*. Committee work, in short, is something like a game of follow my leader, and woe to the man who is disloyal enough to break through convention and take a line of his own. Now let us apply these observations to certain matters connected with our local system of municipal management. With committees of moderate dimensions and limited powers, it matters little by whom the routine departmental business is conducted. Apart from the probability that the majority of a small committee will honestly apply themselves to their duties, and that there is less chance of the independent but diffident member being coolly shouldered aside, there is this great safeguard that, outside the committee, in the council chamber itself, there remains a solid majority of unfettered councillors who need not accept any recommendation, or endorse any transaction, unless good and convincing reasons can be given for so doing. Hence open discussion, fair argument, and the chance of results in favour of the side that can make out the best case. With committees of immoderate dimensions and undefined powers the effect is very different. Such committees come to the council meetings as a solid phalanx, standing shoulder to shoulder like one man; and if they do not constitute an actual majority in themselves, they know that they may always count upon any little additional support that may be required from a certain "ruck," whose faith in official wisdom is unbounded, and who are ever ready to back up a committee on the simple ground "that they ought to know best," and that they would not recommend anything that was not right. Thus it may happen that a little knot of individuals may resolve upon a certain course for reasons known only to themselves; that their decision may be accepted "in faith" by the committee whom they control; and that, this acceptance secured, it may be forced upon the council with a high hand, and with a degree of impetuosity that the few independent outsiders will in vain attempt to stay. And thus it is that public bodies come to be virtually mere instruments in the hands of a self-willed and arbitrary dictatorship, working in the dark, and yet brooking no interference with its action. A committee constituted as we have described becomes, in short, something of an *imperium in imperio*, or rather, perhaps, a Star Chamber, whence questionable, but at the same time irresistible decrees are issued. We take it that is very much like what has occurred with regard to the affairs at the gas-works. In 1867-8 the Gas Committee consisted of five members, and the Water Committee of ten; when the two were combined in 1868-9 we had an aggregate of fifteen; and when to these were added the chairmen of three other standing committees, we had an Investigation Committee of no less than eighteen members, or nearly one-half of the whole council. Against such a power what possible chance have the independent members? None whatever. And yet we find that at the first and most important sitting of the committee of investigation, on Oct. 28, there were only eleven of the eighteen present; at the adjourned meeting, on Nov. 10, there were only twelve present; while at the further adjourned meeting on Nov. 17, only nine put in an appearance. Pursuing our inquiry a little further, we find that out of the twelve present at the first meeting, only nine turned up at the adjourned meeting on Nov. 10, and only seven at the adjourned meeting on Nov. 17; three were present at the second meeting who were neither at the first nor third, two were present at the third meeting who had not been present at either the first or second; and one was present at the first and third who was absent from the second. It is, therefore, obvious that only seven, or less than one-half, of the committee of eighteen have, by getting their names entered on

the minute-book, even *appeared* to devote their personal attention to the inquiry; and how many of these seven can honestly say that they attended for the whole "thirty-two hours," we cannot tell. We do know, however, that when the resolution of dismissal was submitted to the council on Dec. 7, only two out the original eighteen members of the committee of investigation ventured to take an independent course; the rest, excepting four, who were absent, and the mayor, who did not vote, following their leaders like a flock of sheep. That is to say, this resolution was backed up with the overwhelming power of an unprecedentedly large committee, although *only five members out of the number who supported it had been present during the whole of the inquiry on which it professed to have been founded!*

It may be said that the Health Committee is large—it consists of ten members—and yet works well; but in this case we have the advantage of free and open discussion, ample reports of the proceedings through the public press, and the consequent conciliation of public confidence. This example is one that ought to have been voluntarily followed by the Gas Committee. The gas-works are the most important of our public works; they already provide us with a handsome revenue—they yielded last year a profit of about £3000; and to them we look to provide the means for the future improvement of our ancient city. Most necessary, therefore, is it, not only that they should be managed with care, but that the management should be candidly submitted to public criticism. In this respect everything has not hitherto been ordered as it should have been. Towards the end of last year we find the Gas Committee, *without ever obtaining the consent of the Town Council*, inaugurating an expenditure of £6000 upon the extension of the works. Within twelve months we have Mr. Irving (the present chairman) declaring in his place in the council that the outlay was unnecessary, and that the money has, therefore, been squandered; while his committee sit complacently by his side, silently acquiescing in their own condemnation! For our own part we do not agree with Mr. Irving that the expenditure *was* altogether unnecessary; on the contrary, we think that the committee could make out a plausible excuse on that head if they ventured to defend themselves. The case as it stands, however, will suffice for the purposes of our argument. Here is an omnipotent committee taking upon themselves to spend £6000 of the public money in a single year without saying, "With your leave, or by your leave," and the council meekly handing over the needful (or rather the *needless*) without a word of inquiry or a moment of hesitation! What are we to understand from all this? Was this course of so-called extravagance entered upon without due consideration? Or are we to conclude that the committee are merely allowing themselves to be stultified and reproached in order that a share of the obloquy may be reflected upon one whom it is now thought expedient to condemn? What can they hope to gain? They may take to their knees, if they like, and plead that they were unduly influenced by their engineer and their manager; but what would that prove except that they had either been incompetent to undertake the responsible office entrusted to them, or else that they had been culpably negligent in the discharge of their duties? Again, if they have, as Mr. Irving alleges, thrown away £6000 of the town's money, they are not likely to regain public confidence now by the exhibition of virtuous indignation about the price of a street-lamp, or by peddling over old and refuse iron.

It cannot have failed to excite remark that the minutes of the Gas and Water Committee and of the committee of investigation are never produced and read over to the Town Council, along with the minutes of the Health and other standing committees. A gentleman sometimes stands up, pulls a scrap of paper out of his pocket, states vaguely that he has been requested by the committee to move a certain resolution, and the resolution is moved and carried accordingly; but no official minute-books are produced, and no information given as to who was present when the resolution was prepared. This is not acting in accordance with the spirit of the gas Act, which distinctly provides that everything shall be done openly and without reservation. Had the provisions of the Act been honestly observed, we should probably long since have known all about the coal contract, the Holme Head lamp, the nature of the original inquiry into the "irregularities," the various alleged tamperings with the works, the exact condition of the plant, the circumstances which led the committee to spend £6000 over the works, and other matters that have occupied public attention during the last few months, but about which we are still kept considerably in the dark. We desire to see these hole-and-corner practices at once knocked on the head in every department of municipal management. There can never be any sense of confidence or security in a system that requires to be bolstered up by such an amount of mystery and concealment, and those who framed the gas Act twenty years ago were clearly of the same opinion with ourselves. Like master, we are told, like man; and when we see the Gas Committee withholding information that belongs as of right to the council, we need not feel surprised if the servant takes a leaf out of the master's book. The Act, however, gives the ratepayers ample protection, and it is to be hoped that some of their representatives will insist upon the restoration of rights of which they have for a long time been unaccountably deprived. Mr. Irving very truly said at one of the council meetings that the Gas Committee was itself on its trial; and it appears to us that the trial is not yet concluded, if indeed it has fairly begun. We cannot ignore the fact that the irregularities and abuses now alluded to are of infinitely greater importance to our citizens than anything that has been brought home or even attributed to the (late) manager. They demand a searching and impartial investigation, and the Town Council should at once undertake it.—*Carlisle Journal.*

ON THE RELATION BETWEEN THE INTENSITY OF LIGHT PRODUCED FROM THE COMBUSTION OF ILLUMINATING GAS AND THE VOLUME OF GAS CONSUMED.

By B. Silliman,
Professor of General and Applied Chemistry, Yale College, U.S.
(*Communicated by the Author.*)

[Read at the Salem Meeting of the American Asso. for the Adv. of Science, Aug., 1869.]

In photometric observations made to determine the illuminating power or intensity of street gas, it is the practice of observers to compute their observations upon the assumed standard of 5 cubic feet of gas, consumed for one hour; and in the constantly occurring case of a variation from this standard, whether in the volume of the gas consumed or in the weight of spermaceti burned, the observed data are computed by the rule of three up or down to the stated terms. The standard spermaceti candle is assumed to consume 120 grains of sperm in one hour, a rate which is rarely found exactly in actual experience.

For example, a given gas, too rich to burn in a standard Argand burner at the rate of 5 cubic feet per hour without smoking, is consumed at the rate of 3½ cubic feet to the hour, with an observed effect of 20 candles power. This result, previously corrected by the same rule for the sperm consumed, is then brought to the standard of 5 cubic feet by the ratio $3{\cdot}5 : 20 = 5 : 28{\cdot}57$.

The candle power of the gas is therefore stated as 28·57 candles, and this result has been universally accepted as a true expression of the intensity of the gas in question, or the relative value of the two consumptions.

In common with other observers, I have long suspected that this mode of computation was seriously in error as an expression of the true intensity of illuminating flames, and that there were other conditions besides the volume of gas or weight of sperm consumed which must influence and greatly modify the results. As most of these conditions are considered somewhat at length in a paper on "Flame Temperatures," prepared chiefly from researches conducted by Professor Wurtz and myself, and presented at the Salem meeting of the association, they need not be discussed in this connexion.

The results of many trials made with the purpose of determining the value of these photometric ratios indicate clearly that the true ratio of increase in intensity in illuminating flames is, within certain limits, expressed by the following theorem, viz.:—

The intensity of gas-flames—i. e., *illuminating power—varies* (within the ordinary limits of consumption) *as the square of the volume of the gas consumed.*

As the first experimental demonstration of this theorem was made by Mr. William Farmer, the photometric observer at the Manhattan Gas Company's works in New York, I propose to speak of it as "Farmer's theorem." I am also indebted to Mr. Farmer and to Mr. Sabbaton, the well-known and courteous engineer of the Manhattan Gaslight Company, for the free use of their experimental data, and the permission to employ them in illustration here.

The fundamental importance of this new mode of computation will at once appear if, assuming it, for the sake of illustration, to be true, we apply it to the case already given above, which then becomes $3{\cdot}5_2 : 20 = 5_2 : 40$; showing an increase of 40 per cent. over the old rule of correction. Let us see how far this theorem is sustained by the test of experiment.

Experiment 1.—Two similar gas-flames, one at each end of the photometer bar, were made to give exactly the same intensity of illumination. This was accomplished, of course, by placing the Bunsen disc midway between the two burners, and regulating the combustion until the disc was perfectly neutral, the consumption being noted equal by two wet gas-meters under the same pressure. The screen was then moved upon the bar to a point just four times as far from one flame as it was from the other—*i. e.*, the bar being 100 inches, the screen stood at 80, or as 1 : 4. The light from the distant burner was then increased until the disc again showed an equality of illumination. On reading the rate of the gas consumed by the two burners respectively, one gave 3·66 cubic feet, and the other 7·32 cubic feet, or exactly double; or, in other words, the lights were as the square of the volumes of gas consumed, thus:—

$$3{\cdot}66_2 : 7{\cdot}32_2 = 1 : 4.$$

By the old rule the intensity would have been estimated directly as the volume of the gas consumed, thus:—

$$3{\cdot}66 : 7{\cdot}32 = 1 : 2.$$

Experiment 2.—The following results were obtained with the use of a standard Argand burner. The readings of the index meter, the gas consumed in cubic feet, and the ratio of the lights produced, are given in three columns, viz.:—

Index . . .	·0550	= 3·30 feet	= 1 light.
,, . . .	·0725	= 4·35 ,,	= 2·1 ,,
,, . . .	·0856	= 5·13 ,,	= 3·2 ,,
,, . . .	·0926	= 5·55 ,,	= 4 ,,

In this series the lights increase in a considerably higher ratio than is required by Farmer's theorem, which demands 6·60 cubic feet, corresponding to a fourfold consumption, while the actual consumption was 1·05 cubic feet less than the quantity required by the theorem.

Experiment 3.—The following series was obtained by another Argand burner:—

Index . . .	·062	= 3·72 feet	= 1 light.
,, . . .	·0814	= 4·88 ,,	= 2 ,,
,, . . .	·1000	= 6·00 ,,	= 3 ,,
,, . . .	·1203	= 7·219 ,,	= 4 ,,

In this series the ratio is more nearly in accordance with the demands of the theorem, the intensity being still a little in excess of the squares of consumption ($3{\cdot}72 \times 2 = 7{\cdot}44$, in place of 7·219).

The gas employed in these comparisons had a candle power of about 14 candles.

Experiment 4.—Results obtained by a comparison of fishtail burners, ratio as 4 and 9 feet respectively:—

A Index . . .	·0750	= 4·500 feet	= 1 light.
B ,, . . .	·1586	= 9·519 ,,	= 4 ,,

In this comparison the ratio falls but little short of the demands of the theorem.

Experiment 5.—Comparison of fishtail burners:—

A Index . . .	·086	= 5·16 feet	= 1·85 light.
B ,, . . .	·1677	= 10·05 ,,	= 4 ,,

In this trial the departure from the requirements of the theorem is considerably greater than in any of the preceding experiments. But it appears that from some cause the ratio of the squares does not hold with gas of the power used in these trials (14 candles) where the consumption rises above 9 or falls much below 3 cubic feet. This is undoubtedly connected with the well recognized fact that there is for each gas a kind of burner and a volume of gas better calculated than any other to develop its maximum intensity.

Experiment 6.—This series was designed by Mr. Farmer to test by a direct comparison the value of the new as contrasted with the old method of correction. Both trials were made upon the same gas, the second observation following immediately after the first, and with the same candle, and therefore should give about the same candle power.

1*st Trial.*—Consumption of sperm		32·7 grains.
,, of gas		5·004 cubic feet.
Mean candle power (15 observations) .		13·93 candles.
2*nd Trial.*—Consumption of sperm		32·2 grains.
,, of gas		4·58 cubic feet.
Mean candle power of 15 observations		11·8 candles.

The above data calculated by Farmer's Theorem.

5·004 cubic feet and	32·7 grains give	15·15 candles.	
4·58 ,,	32·2 ,,	15·09 ,,	
	Difference,	·06 ,,	

Calculated by the Old Rule.

5·004 cubic feet and	32·7 grains give	15·16 candles.	
4·58 ,,	32·2 ,,	13·82 ,,	
	Difference,	1·34 ,,	

It is obvious, from the study of these results, that within the limits named the increase of intensity in gas-flames, whether naked or Argand, is at a ratio certainly as great as the squares of the volumes of gas consumed; and hence it follows that all the photometric determinations which have been obtained by computation from volumes greater or less than the assumed standard of 5 cubic feet per hour, in the simple ratio of the volumes consumed, must be considered as *absolutely worthless*, provided the theorem of Farmer here announced is confirmed.

It is evident also that this theorem applies with equal force to the weight of sperm consumed by the standard candle as to the volumes of the gas burned in equal times.

With a view to test further the theorem of Farmer, I at once sought to apply it to the case of certain observations I had made upon very rich gas obtained from cannel and other rich coals. The photometric power of these gases had been measured in the usual way heretofore practised by gas engineers, by burning a less quantity than 5 cubic feet in the standard Argand, and then computing up to a standard of 5 cubic feet by direct ratio. The results of this comparison, it will be seen, appear to go far to confirm Farmer's theorem.

Peytona Gas.—This gas was made from a coal of West Virginia, known as Peytona cannel coal. It was much too rich to permit the flow of 5 cubic feet from the 15-hole Argand burner, with a perfect combustion. The gas was therefore reduced by mixture with a measured volume of street gas of known value, and the illuminating power of the mixture having been carefully determined, the value of the Peytona gas alone was readily calculated and fixed at 42·79 candles. The following trials exhibit the result obtained by burning smaller volumes of Peytona gas, and the values obtained by the two methods of calculation:—

No. 1 Argand burner, consuming 5 cub. ft. per hour, mixed gas = 42·79 candles.
2 " " 3·24 " " " 18·95 "
3 " " 3·48 " " " 20·94 "

Here No. 1 represents very nearly the true illuminating power of the gas, and may be assumed as a fair criterion of the law under consideration.

By Farmer's Theorem.

No. 2 becomes $3·24_2 : 18·95 = 5_2 : 45·12$ candles.
3 " $3·48_2 : 20·94 = 5_2 : 43·22$ "

By Direct Ratio (Old Rule).

No. 2 becomes 3·24 : 18·95 = 5 : 29·24 candles.
3 " 3·48 : 20·94 = 5 : 30·09 "

By this it appears that by the old rule, assuming the true candle power of the gas to be 42·79 candles, the two observations Nos. 2 and 3 are in error by about 30 per cent., while by Farmer's theorem the error is reduced to 3 per cent., the former being too small, and the latter too large.

Albert Gas.—The well-known *Albertite* of New Brunswick furnishes a gas of remarkable richness. Its true candle power can be measured only by diluting it largely with street gas of known value, and calculating it from the determined intensity of the mixture. In this way the gas from Albertite is shown to have an intensity equal to 70·38 candles. The following results were obtained by consuming different volumes in the burners named:—

No. 1 Argand burner, consuming 5 cub. ft. = 70·38 candles.
2 " " 2·25 " = 16·39 "
3 "Scotch tip" " 3 " = 25·25 "

By Farmer's Theorem.

No. 2 becomes $2·5_2 : 16·39 = 5_2 : 65·56$ candles.
3 " $3_2 : 25·25 = 5_2 : 70·14$ "

By Simple Ratio.

No. 2 becomes 2·5 : 16·39 = 5 : 32·78 candles.
3 " 3 : 25·25 = 5 : 42·08 "

The differences from the assumed standard of 70·38 candles are as follows:—

By the old rule . . . No. 2 falls short [37·6 candles, or 115 per cent.
By Farmer's theorem . No. 2 " 4·72 " 7·1 "
By the old rule . . . No. 3 " 28·30 " 67·25 "
By Farmer's theorem . No. 3 " ·24 " ·34 "

It will be observed that No. 2 in this series represents a consumption considerably below the minimum, which, in most cases, experiment has shown to be the limit of the proposed theorem, namely, 3 cubic feet; while No. 3, which represents exactly this limit, brings the result within the range of experimental error, it being impossible to make two series of 15 photometric observations which will accord more closely than these.

Wollongong Gas.—This gas was obtained from *Wollongonite*, a new hydrocarbon described by me in a late number of the *American Journal of Science* (July, 1869), as coming from Australia. Its illuminating power was determined by mixing 10 per cent. of the gas with 90 per cent. of street gas. But this mixture was still too rich to burn 5 cubic feet in the Argand standard without smoking, and even when burned at this rate in a fishtail burner, the flame was somewhat smoky and inclined to "tail off." I have therefore little doubt that its true candle power is more nearly 142 candles than 132, as stated in the article referred to. We quote, however, the observations made as follows:—

1. Fishtail burner consuming 5 cubic feet gave 132·94 candle power.
2. " " 1·5 " " 12·89 "

Computing the second observation, we have:—

By Farmer's theorem for No. 2 . . . . . 143·22 candle power.
By direct ratio for No. 2 . . . . . 42·96 "

This is an extreme case, in which the volume of gas consumed in the second observation is far too low, but it is clear that by the old rule the result coming from the consumption of so small a volume of gas is perfectly worthless, while by Farmer's theorem the difference of 10·28 candles is within 7·7 per cent.; while if the true intensity of this remarkable gas is placed, as there is good reason to believe it should be, at 142 candles, the agreement in the two observations is very close.

Every photometric observer can confirm the results here given by reference to his own records of former observations, or by direct experiment designed to test the accuracy of the theorem here announced.

In Sugg's "Gas Manipulation" (London, 1867), page 64, is a tabular statement of the results of an experiment designed to illustrate the unfitness of the "Birmingham" burner (a special form of Argand) to develop the highest intensity of which a gas of 14 candles power is capable when it is used upon any other standard than that of a consumption of 5 cubic feet per hour. By this statement the burner in question produced from 5 cubic feet of gas exactly 15 candles power. But when reduced to 4·5 cubic feet consumption, the candle power, when "corrected to the standard quality of gas by proportion," was only 11·93 candles. The values of the "correction" referred to can only be conjectured, but assuming that the observation made the uncorrected rendering 11·32 candles (a very probable quantity), we find that the law of the squares of consumption then makes the ratio as follows:—

$$4·5_2 : 11·32 = 5_2 : 14.$$

A result which, in view of the facts before given, cannot be regarded as accidental. The theorem applied to this case, as it stands reported (including the correction), gives for the value of the fourth term of the ratio 14·7 candles.

I have endeavoured to apply this theorem to some of the results recorded in the well-known researches of MM. Audouin and Bérard,* but I find these results stated in a manner which renders it difficult to fix clearly the terms of comparison. I venture, however, to append a few comparisons drawn from two of the tabular records of experiments with butterfly or bat's-wing burners of the "fifth series," which, so far as they go, lend confirmation to the views here presented.

Burner of the Fifth Series—Slit $\frac{1}{10}$ Inch wide.

Consumption of the Burners under Trial.	Consumption of the Bengel Argand Standard Burner without Cone; 8-inch Chimney.	Comparative Intensities. The Bengel Burner=100	Intensities by Law of the Squares of Consumption.	Pressures.
Cubic Feet.	Cubic Feet.			
3·1079	3·6024	50	103	·23622
2·4015	3·5318	40	90·9	·19685
2·0131	3·6024	30	96·	·11811
Burners of Same Series—Slit $\frac{1}{25}$ Inch wide.				
3·9555	3·6730	80	92·6	·078474
3·1786	3·6730	60	80·7	·07480
2·6487	3·6730	50	96·7	·07480
2·3309	3·6730	40	97·5	·03937
1·5186	3·6730	20	115·6	·01968

The comparison of their results by this theorem, which gives reasonably exact results for consumptions not greater than that of the standard Bengel burner employed by them, fails when the consumptions become greater than that of the standard.

A comparison of the foregoing results will show that the coincidences with the requirements of the theorem of Farmer are, within the limits assigned, too numerous and too closely accordant to be considered as otherwise than pointing clearly to its general truth. A rigorous demonstration cannot be expected, as there are too many variable functions of unknown value involved in the best methods at present known for photometric measurements to permit more than an approximate proof of its general accuracy. Every photometric observer must recognize its importance, and the necessity, in his observations, of bringing the consumptions of gas and sperm to the agreed standard.

* Ann. de Ch. et Phys., 3rd series, vol. lxv., p. 423, 1862, and translated in the JOURNAL OF GAS LIGHTING, vol. xi., pp. 733, 799, 830.

To the consumer of gas the evident inference from the data here presented is, that where it is important to obtain a maximum of economical effect from the consumption of a given volume of illuminating gas, this result is best obtained by the use of burners of ample flow.

Where a moderate light of equal diffusion is required over a large space, as in public rooms, it may be expedient to use numerous small jets; but when the maximum intensity obtainable from a given volume of illuminating gas is desired, intensity burners of large consumption are plainly indicated.

In the discussion following this paper, Mr. F. Stimpson, state inspector of gas for Massachusetts, brought forward some results of observations he had made upon Farmer's theorem (having been in correspondence with Professor Silliman on the subject), and considered them in comparison with those herewith given. His conclusion was that while in many cases the theorem was closely applicable, in others it was not so. Mr. Stimpson's discussion of the matter will very likely appear in an early number of the *American Journal of Science*.

DR. FRANKLAND'S ANALYSIS OF THE METROPOLITAN WATERS IN DECEMBER, 1869.—"Royal College of Chemistry, Dec. 24, 1869.—Sir, I have the honour to submit to you in the following table the results of the chemical examination of the waters supplied to the metropolis during the month of December. For the purpose of comparison I append also the results yielded by the waters supplied to the towns of Edinburgh, Newcastle, Glasgow, Manchester, Bristol, Dublin, and Norwich, and by Thames water taken at London Bridge at low water on the 8th inst. The water drawn from the main of the Lambeth Company was very turbid, and unfit for domestic use without previous filtration. The Chelsea Company's water was moderately turbid, whilst that of the East London Company had brownish particles suspended in it. All these waters contained living organisms. The rest of the companies delivered perfectly clear and transparent water. The water supplied by the New River Company contained the smallest proportion of organic elements. The West Middlesex Company delivered water of much better quality than that supplied by any other company drawing from the Thames. The above analysis of Thames water as it flows under London Bridge shows that its quality is now so much improved by the diversion of a large proportion of the metropolitan sewage as to render it, if first filtered through sand, available for floating baths, through which a constant and copious stream of pellucid water might easily, and at a moderate cost, be made to flow. Such baths for swimming and general bathing would be, owing to the continual renewal of the water, vastly superior to the ornamental lakes of our parks, or to any baths at present available to large numbers of the population. It is to be hoped that in the coming bathing season private enterprise may find it profitable to supply to the inhabitants of the metropolis a great sanitary boon, which has been long enjoyed by most continental cities.

Companies.	Date and Place of Collection.	Temperature in Centigrade Degrees.	Total Solid Impurity.	Organic Carbon.	Organic Nitrogen.	Ammonia.	Nitrogen, as Nitrates and Nitrites.	Total combined Nitrogen.	Previous Sewage Contamination (Estimated).	Chlorine.	Total Hardness.
Thames.											
Chelsea.....	Dec. 1—Cab Rk., Horse Guards.	7·5	27·6	·289	·045	·001	·351	·397	3200	1·70	19·47
West Middlesex	Dec. 1—Cab Rk., Portland Road.	6·7	27·4	·139	·018	·000	·260	·278	2280	1·52	22·62
Southwark & Vauxhall..	Dec. 1—Cab Rk., St. George's Ch.	6·7	27·9	·186	·030	·000	·265	·295	2330	1·58	21·75
Grand Junction.....	Dec. 1—Cab Rk., Woodstock St..	6·1	27·6	·233	·030	·000	·277	·307	2450	1·60	22·62
Lambeth....	Dec. 1—Cab Rk., Lambeth Road.	7·2	28·6	·362	·045	·002	·406	·453	3760	1·80	18·92
Other Sources											
New River...	Dec. 1—Cab Rk., Totnhm. Ct. Rd.	7·2	28·9	·075	·014	·000	·274	·288	2420	1·38	25·25
East London.	Dec. 2—Slater's, Old Ford Road.	6·7	29·4	·117	·016	·000	·208	·224	1760	1·70	25·25
Kent.....	Dec. 2—Deptford Bdge. Police Sta.	6·7	40·1	·076	·016	·000	·377	·393	3450	2·50	29·95
Edinburgh Waters.											
Crawley Burn	Sept., 1868.		11·28	·187	·031	·001	·000	·032	0	1·042	6·1
Comiston Wr.			22·58	·085	·017	·001	·744	·762	„7124	1·886	10·4
Swanston Wr.			12·70	·378	·059	·001	·000	·060	0	1·390	6·2
Colinton Wr.			14·10	·203	·042	·000	·000	·042	0	0·894	9·2
Newcastle...	September, 1868.		23·4	·237	·062	·000	·000	·062	0	1·588	13·9
Loch Katrine	July1868, Glasgow		3·0	·161	·011	·001	·000	·012	0	·905	0·3
Manchester..	June, 1868.....		6·2	·183	·009	·006	·025	·039	0	1·117	3·7
Bristol.....	Feb.,1869—Water Works		28·66	·160	·017	·001	·203	·221	1720	1·3	24·46
Dublin.....	April,1869—Watr. supply		6·34	·238	·024	·001	·000	·025	0	1·24	2·97
Norwich.....	Sept.,1868—Watr. supply		28·18	·227	·055	·000	·000	·055	0	2·631	23·68
Thames water filtered....	Decembr. 8,1869—London Bridge, mid-stream, at low water		34·3	·558	·085	·103	·351	·521	4040	2·6	25·25
Column 1	2	3	4	5	6	7	8	9	10	11	12

The numbers in columns 4, 5, 6, 7, 8, 9, 10, 11, and 12 all relate to 100,000 parts of the waters. The table is to be read thus: The Chelsea Company's water collected on the 1st of December, at the Horse Guards cab rank, had a temperature of 7·5° Cent.; 100,000 lbs. of it contained 27·6 lbs. of solid impurity; the organic matter, constituting a portion of this impurity, contained ·289 lb. of carbon and ·045 lb. of nitrogen. This solid impurity also contained ·351 lb. of nitrogen in the form of nitrates and nitrites, besides ·001 lb. of ammonia, whilst the total amount of *combined* nitrogen in every form was ·397 lb. The above quantity of water supplied by the Chelsea Company had been, after its descent to the earth as rain, contaminated with sewage or manure matter equivalent to 3200 lbs. of average filtered London sewage. By gradual oxidation, partly in the pores of the soil, partly in the Thames and its tributaries, and partly in the reservoirs, filters, and conduits of the company, this sewage contamination had been converted into innocuous inorganic compounds before its delivery to consumers. The above quantity of water also contained 1·70 lb. of chlorine. Finally, 100,000 lbs. of the Chelsea Company's water contained 19·47 lbs. of carbonate of lime, or an equivalent quantity of other soap-destroying ingredients.—I have, &c.,

"E. FRANKLAND.

"The Registrar-General, &c."

AVERAGE COMPOSITION AND QUALITY OF THE METROPOLITAN WATERS IN DECEMBER, 1869.—The following are the returns of the Metropolitan Association of Medical Officers of Health:—

NAMES OF WATER COMPANIES.	Total Solid Matter per Gallon.	Oxygen required by Organic Matter, &c.	Nitrogen.		Hardness.	
			As Nitrates, &c.	As Ammonia.	Before Boiling.	After Boiling.
Thames Water Comps.	Grs.	Grs.	Grs.	Grs.	Degs.	Degs.
Grand Junction	19·10	0·098	0·018	0·002	14·8	3·6
West Middlesex	18·97	0·031	0·024	0·000	14·3	3·6
Southwark and Vauxhall	18·97	0·031	0·013	0·001	14·5	4·0
Chelsea	19·13	0·102	0·023	0·001	14·6	4·0
Lambeth	19·07	0·098	0·022	0·002	14·5	4·0
Other Companies.						
Kent	27·07	0·013	0·022	0·000	20·4	6·0
New River	18·97	0·009	0·021	0·000	14·2	3·9
East London	18·33	0·022	0·024	0·000	14·4	4·0

Note.—The amount of oxygen required to oxidize the organic matter, nitrites, &c., is determined by a standard solution of permanganate of potash acting for three hours; and, in the case of the metropolitan waters, the quantity of organic matter is about eight times the amount of oxygen required by it.

The average quantity of water supplied daily to the metropolis in the preceding month was, according to the returns of the water companies to the Medical Officers of Health, 97,329,081 gallons, and the number of houses supplied was 473,876. This is at the rate of 30·7 gallons per head of the population daily.

HY. LETHEBY, M.B.

DR. WHITMORE'S REPORT ON THE QUALITY OF THE WATER SUPPLIED IN ST. MARYLEBONE, IN DECEMBER, 1869:—

DECEMBER, 1869.	Total Solid Matter in degrees or grains per Imperial gallon.		* Loss by Incineration of Solid Matter in previous column.		Ammonia.
	Dec., 1868. 0°	Dec., 1869. 0°	Dec., 1868. 0°	Dec., 1869. 0°	0°
Distilled Water					
West Middlesex water	21·72	19·04	·96	·70	—
Grand Junction water	21·60	19·28	·96	·72	—

* The loss by incineration represents the amount of organic and other volatile matters contained in an Imperial gallon (70,000 grains) of water.

DR. WHITMORE'S REPORT ON THE QUALITY OF THE GAS SUPPLIED IN ST. MARYLEBONE, IN DECEMBER, 1869:—

DECEMBER, 1869.	Illuminating Power in Sperm Candles.			Mean Pressure in Tenths of an Inch.		Mean Quantity of Sulphur in 100 Cub. Ft.	Mean Quantity of Ammonia in 100 Cub. Ft.	Sulphuretted Hydrogen.
	* Mean of 24 Obser.	Highest.	Lowest.	Highest.	Lowest.	Grains.	Grains.	
Imperial Company's gas	15·76	16·81	14·66	30·85	10·36	35·64	1·94	None.
Chartered Company's common gas	14·39	15·82	13·90	39·13	15·73	37·13	3·53	None.
Chartered Company's cannel gas	20·20	21·09	19·92	39·10	14·32	33·08	3·51	None.

Mean of daily readings of Barometer . . . 29·54
" " " Thermometer . . 46·32

* Each observation consists of 10 readings of the photometer, at intervals of one minute.

The gas of the Imperial Company gave a mean illuminating power during the month equal to 15·76 sperm candles, and ranged from 16·81 to 14·66 candles; on six occasions it exceeded 16 candles. The quantity of sulphur found in 100 cubic feet of this gas was exceptionally and objectionably large, amounting to upwards of 35 grains, whilst ammonia, on the contrary, was found in very small quantities. The law allows 5 grains of this latter impurity in 100 cubic feet, but less than 2 grains was the mean. The Chartered common gas gave a mean light equal to 14·39 candles; twice it exceeded 15 candles, and twice it was below the legal standard of 14 candles. The quantity of sulphur found in this gas was even greater than that found in the Imperial gas; it amounted to upwards of 37 grains per 100 cubic feet, and was nearly twice as much as was permitted by the former Gas Act. The ammonia found was small in quantity, amounting to 3½ grains in the 100 cubic feet. The illuminating power of the cannel gas showed a mean equal to 20·20 candles; once it exceeded 21 candles, but three times it was below the legal standard of 20 candles. The quantity of sulphur in this gas was also large, amounting to 33 grains per 100 cubic feet. The quantity of ammonia did not exceed a mean of 3½ grains. On no occasion was the presence of sulphuretted hydrogen detected in either of the gases, and with regard to pressure it was generally good. The above results were obtained from the Imperial Company's gas manufactured at their Fulham works, and from the common and cannel gas of the Chartered Company, manufactured at their works in Horseferry Road, Westminster.

DR. STEVENSON'S REPORT ON THE GAS SUPPLIED BY THE IMPERIAL COMPANY TO THE VESTRY OF ST. PANCRAS DURING THE MONTH OF DECEMBER, 1869.

Date.	Number of Observations.	Average Light in Candles produced by 5 Ft. of Gas per Hour.	Light in Candles reduced to Consumption of 120 Grs. per Hour.	Traces of Ammonia.	Traces of Sulphuretted Hydrogen.
Dec. 2	10	13·2	15·1	Present.	None.
4	10	13·4	15·0	"	"
6	10	14·4	15·2	"	"
8	10	14·1	15·5	"	"
13	10	13·5	14·8	"	"
15	10	14·3	15·1	"	"
16	10	14·5	15·5	"	"
18	10	13·8	14·9	"	"
21	10	13·8	15·2	"	"
23	10	14·8	16·8	"	"
24	10	13·6	14·7	"	"
28	10	12·9	14·7	"	"
	10				

The maximum illuminating power of the gas was 16·8 standard sperm candles, on the 23rd; the minimum 14·7 candles, on the 24th and 28th. The average was 15·2 candles; 12 candles is the statutory illuminating power. Ammonia was always present, sulphuretted hydrogen invariably absent. The total amount of sulphur was 8·17 grains per 100 cubic feet.

THOS. STEVENSON.

SOUTH ESSEX WATER-WORKS COMPANY.—An extraordinary meeting of this company will be held on the 24th inst., "to consider a proposal made by Messrs. Easton, Amos, and Anderson, for taking the works of this company, with certain extensions, on lease for a period of eight years, to commence from the 30th day of June, 1870; and for continuing in force in the interval the present arrangements between them and the company; and to pass such resolutions in respect thereof as the meeting shall determine."

RIVER CONSERVANCY AND POLLUTION.—A meeting, consisting of the mayors and other representatives of the towns of Leeds, Halifax, Huddersfield, Wakefield, Dewsbury, Batley, Keighley, and Bingley, was recently held at Leeds for the purpose of considering a bill, of which notice has been given for the next session of Parliament, called "The Aire and Calder Conservancy Bill." The Mayor of Bradford was absent on account of a previous engagement, but he had declared his opposition to the bill, as it proposes to take the entire control of the two rivers from their rise to the point where they fall into the Humber; and to obtain power over the sewers in the various boroughs of the clothing and worsted districts of the West Riding. These and other general grounds of opposition were lucidly stated to the meeting by the Mayor of Leeds (who presided), and by the Mayor of Halifax (who had initiated the meeting). The Corporation of Leeds had, however, already agreed to oppose the bill. Mr. M'Cree (Mayor of Halifax) said he had initiated the meeting on account of an injunction of a very onerous and oppressive character to compel the Halifax Corporation to get rid of their sewage through a district which by its very nature offered almost every possible obstruction. The Government had no measure to guide them in doing so, nor was any engineer able to point out any efficient system by which the sewage of such a district could be disposed of for the benefit of the population and for the cleansing of the rivers. He concluded by proposing—"That the Aire and Calder Conservancy Bill is highly objectionable, and that the various local authorities affected by it oppose its further progress in Parliament." Mr. W. C. Jones (Mayor of Huddersfield) seconded it, and it was carried. Alderman Hutchinson (Halifax) said he and the Mayor of Halifax had sent circulars to all the boroughs of England, and there was every promise of such an effort to bring in a suspensory bill that the Government would not be able to resist it. The town-clerk of Wakefield gave reasons for stating that there was no probability of Government dealing with the pollution of rivers this year, and he said it had been suggested at the Home Office that the matter should be at once taken up locally. Alderman Carter, M.P., suggested that it would prejudice the opposition this meeting had agreed upon to the Aire and Calder Conservancy Bill to entertain the question mooted by Alderman Hutchinson, and it was agreed to withdraw it. A vote of thanks was given to the Mayor and Corporation of Leeds.

THE RATES AT MARYPORT.—The following extract from the estimate made by the clerk to the Maryport Town and Harbour Trustees for the general district-rate for the half year may not be devoid of interest to the ratepaying community at Maryport. The rateable value of the whole district is estimated at £12,000, which yields, at 1s. in the pound, the sum of £600. The new gas-works, which the trustees erected at the commencement of last winter, appear to have cost £11,000, which at 4½ per cent. adds a charge upon the rates of £247 10s. for the half year. The working expenses amount to £283, and the amount of sinking-fund to be set apart each half year is £110, making a total for the half year of £640 10s. The harbour contributes £142 7s. 6d. for harbour lights, and the cost of lighting the district therefore stands at £498 2s. 6d. for the half year, or £996 for the year. This is exclusive of the perpetual ground-rent of £28, which has to be paid for the site on which the trustees gas-works are erected. The town has now been supplied for some length of time with water, and the water-rents, which are considerable, will go a great way towards easing the extra taxation which will ultimately have to be resorted to, the present rate being manifestly insufficient for both water and gas purposes. Parliament having deprived the trustees of the power to supply private consumers, no profit can possibly accrue to them from manufacturing gas; indeed, the old company, before the trustees commenced the erection of their new works, lighted the town for the comparatively small sum of £300 per annum, which cannot be done now by the trustees under £996 5s. for the year.—*Carlisle Journal.*

THE SANITARY CONDITION OF GLASGOW.—The high rate of mortality in Glasgow for some time past has been the subject of frequent and anxious deliberation by the public authorities of that city, and several weeks ago a deputation from the Police Board visited Bristol and other English towns with the view of ascertaining what improvement might be effected in the existing sanitary regulations. The deputation made their report to a special meeting of the Police Board, held on Wednesday, and as the result of their observations they recommended—(1) that the staircases of buildings tenanted by the working classes should have an opening to the roof, and that through and thorough ventilation should be secured in the lobbies; (2) that some simple means of ventilation beyond the control of the inmates be introduced into every apartment; (3) that every dwelling should have a water supply and needful conveniences, the latter to be constructed on a plan which would give the least offence to health; (4) that the surfaces of all courts and closes be laid with pavement, or other impenetrable and durable material, so that there should be no opportunity for filth or stagnant water gathering; (5) that the police should strictly enforce the existing regulations for keeping stairs and closes clean; (6) that a staff of sanitary officers should undertake a system of house-to-house visitation, for the purpose of inculcating cleanliness and ventilation; and (7) that the practice pursued in Bristol, under the direction of Dr. Davies, of destroying the germs of typhus fever by strong chemicals, should be adopted. The deputation concluded their report by expressing a desire to see an improved construction of dwellings for the working and poorer classes in Glasgow. They were impressed with the advantages, in a social as well as sanitary point of view, of the self-contained cottage form of building prevailing in Bristol and other English towns, and they heartily recommended that form to Scotch builders. The Police Board, on the motion of the Lord Provost, appointed a Health Committee to carry out the recommendations in the report, and generally to deal with the prevention of excessive mortality in the city.

THE WATER SUPPLY OF LONDON.—The quantity of water supplied daily to the metropolis during the year has ranged from 91,578,341 gallons in the month of January to 110,094,058 gallons in the month of July; the average for the whole year being, as near as possible, 92,000,000 of gallons daily, and the average number of houses supplied has been 466,100; this is at the average rate of 29 gallons per head of the population daily. About half of the supply is from the Thames, and the rest is from the river Lea and from springs and wells in the chalk. According to the official returns from the Prefect of the Seine, the average daily supply of water to Paris during the year has been 46,858,900 gallons, which is at the rate of 24·8 gallons per head of the population; but this includes the supply to the public fountains, and to the ornamental waters in the Bois de Vincennes, the Bois de Boulogne, and elsewhere. The water is derived from the Seine, the Marne, the Canal d'Ourcq, and from artesian wells and springs in the chalk. None of the river water is filtered, and it is always turbid.

LONDON GASLIGHT COMPANY'S WORKMEN'S CLUB AND INSTITUTE.—Mr. W. C. Parkinson, of Cottage Lane, City Road, E.C., gave an entertainment last Tuesday evening to the members and friends of the above institute, consisting of a series of highly amusing and interesting dissolving views, illustrative of China and the Chinese, accompanied by an explanatory address. The audience was very numerous, the hall being densely crowded, and they expressed their appreciation

of the lecturer's efforts by frequent applause, and gave him three hearty cheers at the close. On the 31st inst. there will be a popular lecture in connexion with the Twickenham Economical Museum, on "Light and Heat," with familiar experiments; to be followed, on the 22nd of February, by a concert given by the members and their friends.

Register of New Patents.

3896.—JOSEPH BREEDEN, of the firm of J. and W. Breeden and Booth, of Birmingham, in the co. of Warwick, manufacturers, for "*Improvements in taps or valves for liquids, gases, and vapours.*" Patent dated Dec. 21, 1868.

The body of the tap or valve consists of a chamber, in which a conical valve-seat, having its greatest diameter downwards, is formed. The lower division of the body of the tap communicates with the ingress-pipe, and the upper division with the egress-pipe. Working on the valve-seat is a conical valve, opening downwards. The spindle of the conical valve works in a tube on the bottom of the lower division of the body of the tap, and a coiled spring on the spindle raises the valve, and keeps it to its bearing on the conical seat described. The pressure of the liquid steam or gas also tends to raise the valve and press it on its seat. In the top of the body of the tap is an opening from which a tube depends. The tube is screwed within, and a screw-rod, with a hand-wheel or other handle at the top, rises and falls by a rotary motion in the said tube. When the handle is so turned as to depress the rod, its lower end presses upon and depresses the valve, and a communication is thereby opened between the ingress and egress pipes. By reversing the motion of the handle, the valve, no longer pressed from its seat, is raised thereto by the spring, and the communication between the ingress and egress pipes is closed. The motion of the screwed rod and valve downwards is limited by the spindle of the valve, and the motion of the said rod upwards is limited by its enlarged lower end coming against the lower edge of the screwed tube. The valve is guided in its motion by three or other number of upright guides, situated near its periphery, working in a short tube surmounting the valve-seat.

3952.—CHARLES DENTON ABEL, of 20, Southampton Buildings, ChanceryLane, in the co. of Middlesex, patent agent, for "*Improvements in the manufacture of wrought-metal pipes, and in the apparatus employed for that purpose.*" A communication. Patent dated Dec. 29, 1868.

Metal pipe, other than such as is formed by the exudation of molten metal through properly-shaped dies or by casting, is usually made by folding long sheets or strips of rolled metal, and welding the edges where folded together. This folding is usually done by drawing such sheets and strips through between the converging concave faces of a pair of skelping-dies, the two dies at the forward end, when closed together, having a front aperture of a nearly tubular shape; such dies are made in two parts, with the plane of division running longitudinally and vertically through them, and the two parts are hinged together at the top; to operate them it is necessary to open up the hinged die, introduce the metallic strip or skelp-bar from which the pipe is to be made so far that its forward end shall project somewhat beyond the forward end of the dies, close down the hinged die, to do which requires sufficient force to fold the skelp-bar to a tubular shape, and then, after properly fastening the moveable hinged die, catch the projecting forward end of the skelp-bar with a pair of tongs, and draw the bar through.

The present invention relates to the construction and use of improved dies for the purposes above set forth, and the nature of it consists in making a slot or opening in such dies along the back or line of division of the upper parts sufficiently large to admit of the passage through it of the jaws of a pair of tongs or other device by which the skelp-bar is to be drawn through the dies; and it further consists in the construction and arrangement of machinery for manufacturing pipes in connexion with such dies. The hinging of one of the dies is thereby dispensed with, both being made fixed, and the skelp-bar is caught at the middle of one end with a pair of tongs, and is introduced into the dies at the flaring end and is drawn through, passing the jaws of the tongs along the slot or opening in the upper part of the dies.

The advantages of the before-described improvements are, a cheaper construction of dies, since both of the dies are fixed and the cost of hinging is wholly obviated; the labour of forcing the hinged die downwards after the blank is introduced is also saved. With this invention no manual labour is required, except to catch the blanks with the tongs. As neither of the dies where they are in use requires to be moved, wear and tear are reduced to a minimum. A better skelp is also produced, since with the ordinary mode of doing such work the skelp-bar or blank is apt to be kinked in closing down the hinged die with consequent loss in the pipe when made. The dies may be made separate or together, so as to form a single die with two faces opposite each other. If made separate they may be easily adjusted on the bed, so as to form the skelp exactly of the proper size.

3954.—ALEXANDER BROWNE, of the firm of Browne and Co., of 49, King William Street, in the City of London, patent agents, for "*Improved methods and processes of manufacturing illuminating gas, and apparatus to be employed therein and therefor, and in treating the products of such processes to improve and increase their commercial value.*" A communication. Provisional protection only obtained. Dated Dec. 29, 1868.

This invention consists in operating upon petroleum or other hydrocarbon, and some of the products derived therefrom, in novel and improved apparatus, for the purpose of producing illuminating gas. In two closed tanks the crude petroleum and benzole are placed separately. The tank containing the petroleum is placed above the ground, and that containing the benzole below the ground, and the latter is surrounded with water. In tank 1 is placed a worm or steam coil, to heat the liquid in the tank; an air-pump is also connected with the bottom of this tank, for forcing air thereinto. The warm vapour and carburetted air are conveyed from tank 1 into tank 2 by a pipe reaching nearly to the bottom of tank 2, and from the top of this tank a pipe is led to deliver the non-condensable or permanent gas into the gasholder or gasometer.

3975.—JOHN GEDGE, of Leo House, Addington Square, Margate, in the co. of Kent, patent agent, for "*Improvements in the manufacture of gas apparatus or fittings.*" Provisional protection only obtained. Dated Dec. 30, 1868.

According to this invention it is proposed to construct the gallery or support for the glass with jointed in lieu of rigid arms, as hitherto practised—that is to say, the three or more arms which radiate from the ring are moveable simultaneously, in such a manner as to permit the glass to pass upwards on the pendant. This is done by jointing the arms either at their junction with the ring or in their centres, such joints being so formed as not to permit the outer portion of the arm to pass downwards lower than a horizontal position, and the globe or glass will be passed on to the pendant from below the pressure of its lower portion against the arms of the gallery, and will cause them to rise and assume an angular or even a vertical position, thereby permitting the glass to pass up the pendant shaft until its rim shall have passed above the ends of the arms, which will then fall into a horizontal position and form the gallery or support. The glass is then secured thereon at its rim in the ordinary manner. One or more jets may be used, the nipples being fastened on small elbow-shaped burners, projecting from the pendant, and the effect of heat or smoke on this pendant or shaft may be obviated by the use of one or more small reflecting plates flat, curved, or of any suitable shape, fitted on to the said shaft a little above the burner or burners.

3909.—FREDERIC NEWTON GISBORNE, of 445, West Street, in the co. of Middlesex, for "*Improvements in means or apparatus for generating gas used for heating and lighting, and in means for heating by gas.*" Provisional protection only obtained. Dated Dec. 22, 1868.

This invention consists in the employment of apparatus composed of a cylinder, which is provided with two chambers at its lower part; into the lower chamber is admitted air, and into the upper one gas. From the top of the lower chamber rise pipes or tubes, which pass up to or through the top of the gas-chamber, a suitable annular space being formed around each of such tubes in the cover of the gas-chamber. A combustion-chamber is formed above the gas-chamber and a boiler above the combustion-chamber, through which boiler pass suitable tubes to carry off the products of combustion, and such tubes rise up a certain distance above the water-level, and immediately above such tubes are fixed one or more retorts.

3910.—JOHN SNAPE, of Mountain Ash, near Aberdare, South Wales, mechanical engineer, for "*Improvements in pumps or apparatus for drawing and forcing fluids, particularly applicable to the ventilation of mines.*" Patent dated Dec. 22, 1868.

This invention consists in the employment of two drums, one of which is formed with six or other convenient number of convex surfaces, and the other with corresponding concave surfaces. These two drums revolve in opposite directions, and in their revolution the convex portions of one fit into the concave portions of the other. When applied to ventilating mines, they are fitted at the upper end of the air-shaft, and their respective convex and concave portions in their revolution move round in segments of circles. In the revolution of the convex drum, air from the shaft is drawn into the space between each successive pair of convex surfaces, and is carried off in this space round the segment until it reaches the open air; in the revolution of the concave drum air is in like manner drawn into each successive concave or recess, and carried off in the same manner.

3914.—JOSIAH GEORGE JENNINGS, of Palace Wharf, Lambeth, in the co. of Surrey, sanitary engineer, for "*Improvements in apparatus for treating sewage, and for irrigating land with sewage and other waters.*" Patent dated Dec. 22, 1868.

This improved apparatus consists of a hollow rotating screen of conical or other form, into the interior of which the sewage is directed. The sewage, in entering the screen, is made to act on a water-wheel or on float-boards or similar instruments on its axis, and so the screen is rotated. The sewage enters the screen at one of its ends, and runs through its sides and is received into a trough below, whilst the stones and solid matters are discharged at the opposite end of the screen into a cart or other receptacle. In driving the screen as above described by a water-wheel, acted upon by the sewage before it enters the screen, the power for driving the screen might be obtained by causing the sewage, as it flows away after passing through the screen, to drive a water-wheel, or the screen may be driven by other power. In some cases a screen is employed, formed by joining together a number of bars, so as to form an endless straining surface. This endless surface is passed around rollers, and held distended between them. The sewage is let on to the surface as it slowly travels around the rollers. The liquid flows through and is received into a trough on the other side whilst the solid matters are carried along and discharged over the roller as the bars pass around it. The passage over the rollers tends to free the straining surface from obstructions.

3929.—ALEXANDER MELVILLE CLARK, of 53, Chancery Lane, in the co. of Middlesex, patent agent, for "*Improvements in gas-burners.*" A communication. Patent dated Dec. 23, 1868.

This invention relates to improvements in gas-burners, the chief features consisting, first, in the novel arrangement of the burner, properly so called; and, secondly, in the mode of supplying the gas thereto by means of a central passage in connexion with air passages at the lower part of the burner. Attempts have before been made to supply the gas at the centre of the burner without the aid of a forked pipe, but the ring of metal forming the base of the burner and the tubes supplying the air in such burners are liable to be expanded by the heat, and so produce escapes.

According to this invention the burner is cast in a single piece, and the screwed stem is connected to the cone by arms, also made hollow, and uniting with the orifice in the stem for the admission of the gas. A cap encloses the burner to which it is fitted; this cap is perforated at top, and receives the gas from arms.

The admission of air to the burner may be regulated by means of a slide or slides, according to the supply of gas or the degree to which the inlet passage of the supply-cock is opened. In this manner a perfect and uniform combustion with a maximum of light at a minimum expense may be obtained. With a view to prevent any shade being thrown by the cones, and also to permit of the burner being more easily cleaned, the mounting is made of glass, cystal, porcelain, or other translucent substance.

12.—SAM SMITHSON, of Heckmondwike, in the co. of York, dyer, GEORGE SENIOR, of Brighouse, in the same co., brass finisher, and JOHN INMAN, of Brighouse aforesaid, brass finisher, for "*Improvements in taps and valves.*" Provisional protection only obtained. Dated Jan. 2, 1869.

These improvements relate to taps or valves for regulating the discharge of fluids, and consist in constructing the valve either so as to have a surface of cork fixed to it, or to press upon a surface of cork fixed in the seating, and to be capable of moving to or from the seating without turning on its axis, being attached to the spindle by a screw-thread, and the spindle is formed to fit a conical gland so as to avoid packing. By turning the spindle in one direction, the valve will be removed from its seating to open the passage, and by turning it in the other direction it will be pressed upon it, and thereby close the passage.

19.—WILLIAM ADOLPHUS BIDDELL, of Edward Street, Parade, Birmingham, brassfounder and electro-plater, and JOHN REDGRAVE, of Pershore Road, Birmingham, gentleman, for "*Improvements in the manufacture and ornamentations of chandeliers, lamps, lustres, and other articles.*" Provisional protection only obtained. Dated Jan. 4, 1869.

These improvements relate, in the first place, to a new mode of forming or ornamanting chandeliers, lamps, lustres, and other articles. This is effected by attaching, either by fusion or by other suitable means, various ornamental devices made of pressed glass, either plain, coloured, or inlaid. Ornamental pressed glass suitable for this purpose is obtained by colouring or inlaying the interior of the glass after being taken from the moulds.

20.—SAMUEL JOSEPH PEET, of Leeds, in the co. of York, for "*Improvements in valves or cocks.*" Patent dated Jan. 4, 1869.

According to this invention the sliding portion of the improved valves is divided longitudinally into two parts, which, when the valve is closed, are pressed apart from one another and against their seats; when the valve is to be opened, the two parts are drawn towards one another and away from their seats, and the slides can then very readily and with very little friction be drawn up into the chamber. To thus force the two parts away from one another when the valve is closed, a wedge is employed, which is formed with a stem passing up through a stuffing-box in the top of the chamber. The stem of the wedge has a screw-thread cut upon it, either to work into corresponding portions of threads cut in the two halves of the slides, or the screw of the stem may work into a thread cut around the sides of a hole formed through the wedge itself; in either case the wedge may be forced down between the parts of the slides by turning the stem.

45.—GEORGE EVELEIGH, of Tredegar Road, Bow, in the co. of Middlesex, consulting chemist, for "*Improvements in the manufacture and purification of gas for lighting, and in the means of applying the same to heating purposes, parts of which improvements are also applicable to the purification of mineral oil.*" Patent dated Jan. 7, 1869.

This invention relates to the manufacture of gas for lighting purposes from coal, shale, wood, bitumen, petroleum, or other substances containing carbon, hydrogen, or nitrogen in their chemical composition, and to the purification thereof; also to certain means of producing gas from such liquefiable substance for and applying it or impure gas otherwise obtained from the substances above mentioned to the purpose of generating heat in furnaces, or in other situations where heat is required; and to the purification of mineral oil, for the purpose of rendering it non-explosive below a temperature of 300° Fahr.

The improvements in the manufacture and purification of the gas obtained from the substances referred to consist in the application of certain means for the distillation or redistillation thereof, and the reduction during that distillation or redistillation of all or any of the waste products ordinarily produced in the distillation of such gas from those substances, so as to convert the whole (or nearly the whole) of such distilled waste products into an increased quantity and improved quality of gas for lighting or heating purposes. These improvements are effected by passing the gas, as soon as produced from the substances, through upright tubes, cylinders, or chambers, which, for convenience, are called redistillation retorts, and of which one or more may be employed, of dimensions suitable to the quantity of gas to be produced, and the extent of purification required. The redistillation retorts are loosely filled with any one or more, as may be required, of the following, or any other substances which will produce similar effects—namely, charcoal, coke, chalk, lime, bones, limestone, filings, turnings or pieces of iron, or other metal, or scorious metal not charged with sulphur, or of metals somewhat oxidized, which substances for convenience are called chemical purifiers. The redistillation retorts (if more than one are employed) are then connected together and to the gas-generating retorts by suitable pipes, so as to allow the gas as produced to pass through them and amongst the chemical purifiers contained therein. They are placed in a suitable furnace and raised to a more or less red heat, according to the nature of the gas or the substance from which it is produced, and the extent of purification required. The gases and waste products in passing through the heated chemical purifiers in the redistillation retorts will undergo the necessary chemical changes to produce gas of the required quality and purity, and will leave little or no residue; the quantity of gas resulting will be much increased, while the sulphur will be united to the metallic substances or calcareous earths contained in the redistillation retorts, and can thus be removed in a dry and inoffensive state when needful. The purified gas may then be cooled by passing through pipes exposed to any ordinary cooling influence; it may then go at once to the gasholder for use.

46.—JAMES MANSERGH, of 3, Westminster Chambers, in the city of Westminster, engineer, for "*Improvements in stench-traps.*" Provisional protection only obtained. Dated Jan. 7, 1869.

This invention consists of a vessel of iron, clay, or other material, to be placed outside a house or dwelling in any convenient position, for the attachment of a waste pipe or pipes leading from the sinkstone or other place. These sockets, pipes, or openings are formed in the gully, two at the top and one at the side. The opening at the side is for the purpose of attaching the gully to a pipe-drain conveying the refuse of the house to the main sewer. At the same end, but at the top of the gully, is formed another opening, to which may be attached air-tight an ordinary water down spout or other pipe, to act as a ventilator for the house drain; and to prevent the sewer gases from being put under pressure a diaphragm is formed across the gully and in the top part, extending the full width of the gully, and below the bottom of the outlet-pipe or drain, thus making an ordinary water stench-trap. In the upper part of the gully, and at the side opposite the house drain-pipe, is placed an open moveable grating, to allow of the ingress of the surface water from the yard or place where the gully may be situated, and for the removal of any deposit which may accumulate in the bottom of the gully. At the end of the gully which is farthest from the drain, and beyond the grating, is formed a smaller vessel, trapped in a similar way to that of the lower part of the gully, with an opening or provision for attaching the waste pipe or pipes from the sinkstone or any other place.

72.—THOMAS MOORE, of 32, Bridge Street, Southwark, engineer, for "*Improvements in rotary engines, which may be used as pumps or water-meters.*" Provisional protection only obtained. Dated Jan. 9, 1869.

According to this invention an outer cylinder or bored cylindrical casing is employed with two end covers suitably constructed to receive a shaft or axis through their centres, the passage of the shaft or axis being made water-tight. On this shaft or axis is fixed a cylinder, drum, or piston, leaving an annular space between its circumference and that of the outer cylinder or bored cylindrical casing. The periphery of this cylinder, drum, or piston is suitably formed to receive two, three, or more hinged buckets, fans, or flap-valves, which hinged buckets, fans, or flap-valves are actuated by means of a cam or cams of forms convenient to the purpose. The cam or cams are placed in a recess formed in one of the end covers, and, through the intervention of rollers and levers, cause the hinged buckets, fans, or flap-valves, during part of the revolution of the machine, to obstruct in a water-tight manner the annular space left between the outer cylinder or bored cylindrical casing and the cylinder, drum, or piston, and during the other portion of a revolution to lie in recesses formed in the periphery of the cylinder, drum, or piston for this purpose. It is by the action of water properly introduced by an inlet-pipe on to these hinged buckets, fans, or flap-valves that a rotary motion is imparted to the cylinder, drum, or piston, and motive power obtained, the waste or used water being of course permitted to run away through an exhaust passage or outlet-pipe.

90.—BRISTOW HUNT, of 1, Serle Street, Lincoln's Inn, in the co. of Middlesex, gentleman, for "*Improvements in water-meters.*" A communication. Patent dated Jan. 12, 1869.

These improvements consist in so constructing a valve piston or sleeve, resting on a ring provided with double inclines, that as the water is let in above, the piston or sleeve will be pressed downwards, thus causing a downward spiral movement of the sleeve. The piston or sleeve is provided with slots or ports on its sides, so arranged in relation to ports in a hollow shaft or in an outside cylinder as to change the direction or current of the water from one side to the other of the moveable wing in the lower cylinder, whereby a semi-rotating motion is imparted to the shaft, in turn acting upon the cone ring, so as to cause a change in the position of the cone ring relatively to the sleeve or piston.

95.—GEORGE VERRELL OSBORNE and ALFRED JAMES PEERLESS, both of Rahere Street, Goswell Road, in the co. of Middlesex, for "*An improved ball-valve or cock.*" Patent dated Jan. 12, 1869.

It is proposed to carry out this invention in the following manner:—In a suitable casting a valve formed with a stem is adapted, the upper part of which works water-tight through a hole in the casting, and the protruding part of the stem is connected to one end of a horizontal vibrating bent lever, to the other end of which a hollow ball of metal is fixed and operated upon by the water in the cistern, in which the ball-valve is fixed in the usual way. The diameter of the aforesaid valve is somewhat less than the opening in the casting in which it works, and the valve, which is formed of vulcanized india-rubber, is kept tight by coming into contact with an annular seat at the top of a short outlet-pipe, through which the water passes from the water-main into the cistern for filling the same, the water entering the valve-casting by another short pipe fixed thereto and to the service-pipe, at right angles, or nearly so, to the aforesaid outlet-pipe.

100.—JAMES STEEL, of Glasgow, in the co. of Lanark, N.B., for "*Improvements in sanitary arrangements to be substituted for water-closets.*" Patent dated Jan. 13, 1869.

According to these arrangements a space is enclosed by walls outside the staircase, and is carried up the entire height of the building, or nearly so. This space is partially boarded over, and a closet with a seat is constructed at each flat, but the several closets are arranged so that the space below each seat is perfectly clear down to the bottom. Thus, if the space or shaft enclosed by the walls were continued with the same width up to the top, which could be done if preferred, then the top closet would occupy the whole horizontal area, the next below it would occupy that area diminished by a shaft from the seat above, and the lower ones would occupy spaces diminished by the other shafts, corresponding to the number of shafts above.

104.—JULIUS SCHLÖSSER, of the city of Frankfort, in Germany, but at present residing at 14, Finsbury Place, in the co. of Middlesex, civil engineer, for "*A new or improved self-acting metallic packing for parts of steam, air, gas, water, or other fluid pressure engines, or for pumps or other machinery or apparatus in which packing is required.*" Patent dated Jan. 13, 1869.

This improved packing is contained in an ordinary box, with its gland connected in the usual way by bolts and nuts. It is composed, in the first place, of an inner metallic shell, divided into two halves, and cast in a particular metallic alloy, which is called anti-friction. Internally this piece is cylindrical throughout its entire depth, and bored to the same diameter as the rod it is intended to fit externally. Its upper part, which fits in the gland, is conical, whilst its lower part is cylindrical, except at its junction with the conical part, which is also conical. The lower cylindrical part of the shell extends below and beyond the shoulder usually employed to receive a metallic ring, which ring is suppressed in this system. This shell is divided in the direction of its height into two parts.

105.—WILLIAM ROBERT LAKE, of 8, Southampton Buildings, Chancery Lane, in the co. of Middlesex, consulting engineer, for "*An improved method of and devices for uniting the ends of pipes or tubes.*" A communication. Patent dated Jan. 13, 1869.

According to this invention, the ends of each pipe, or each length or section of pipe, are provided with a moveable flange, which is kept in place by collars or projections on the end or head of each tube. The collars extend only partially around the tube, and the loose flange is formed with recesses or apertures, which, when brought opposite the collars, will pass over them, and which may be turned partially around behind the collars, the flange being thereby securely held on the pipe. By this means the flanges may be conveniently placed on the end of the pipe or removed therefrom, and may be adjusted to receive the bolts whereby the pipes are secured together. Between the two pipes or ends to be connected together is placed an annular connecting-piece or coupling, which is recessed on each side to receive a ring of india-rubber, or other suitable packing material, against which the end of each pipe is bedded. These connecting-pipes are made with their faces either at right angles to the bore of the pipes, or with one face, or with both faces, oblique or inclined at any desired angle. When these connecting-pieces are properly arranged between the ends of the pipes, the loose flanges are connected by the bolts and nuts, and by screwing down the nuts the two ends of the pipe are drawn together, and made to bed closely on the packing-rings, thereby making the joint perfectly tight and secure.

107.—GEORGE DOMINICUS KITTOE and PETER BROTHERHOOD, both of 56, Compton Street, Clerkenwell, in the co. of Middlesex, engineers and millwrights, for "*Improvements in valves.*" Patent dated Jan. 14, 1869.

These improvements consist in fixing on the valve, at or near its periphery, a ring or edging of caoutchouc, projecting from the face of the valve. The ring or edging is of such a section that its base, where it is attached to the valve, has considerable breadth, while its summit, or that part which in closing comes first in contact with the seat, is narrower and rounded. Thus, as the valve closes, the narrow apex of the elastic ring or edging, in first meeting the seat, yields to the pressure, and, as the valve closes further, the compressed material presents an increasing breadth for resistance. The elastic edging may be fixed on the seat instead of the valve. The valve or the seat may be either of metal or of hard caoutchouc, such as ebonite or vulcanite. The edging may be fixed either by pitchy or resinous cement, or by suitable flanges, or by moulding it in its soft state into dovetailed recesses formed in the valve or seat; but it is preferred to fix it during the progress of vulcanization.

APPLICATIONS FOR LETTERS PATENT.

3782.—THOMAS FRANCIS FRANCE, of Wigan, in the co. of Lancaster, plumber, for "*Improvements in the construction of baths and water-closets.*" Dec. 31, 1869.

3.—STEPHEN HOLMAN, of 10, Laurence Pountney Lane, in the City of London, engineer, for "*Improvements in apparatus for hinging, adjusting, and fastening gas retort-lids, covers, or doors, and other lids, covers, and doors.*" Jan. 1, 1870.

15.—THOMAS CHARLES OLNEY, of Manchester, in the co. of Lancaster, for "*An improved gas-stove, part of which is also applicable to blow-pipes and forges.*" Jan. 3, 1870.

20.—FREDERICK FOSTER, of Lansdowne Cottages, Essex Road, Islington, in the co. of Middlesex, for "*Improvements in instruments for measuring fluid or other pressure or weight.*" Jan. 3, 1870.

35.—ISHAM BAGGS, of High Holborn, in the co. of Middlesex, practical chemist, for "*Improvements in purifying coal gas.*" Jan. 5, 1870.

38.—EDMUND EDWARDS, of 22, Buckingham Street, Adelphi, in the co. of Middlesex, for "*Improvements in cocks and valves.*" Jan. 5, 1870.

47.—GEORGE DOMINICUS KITTOE and PETER BROTHERHOOD, both of 56, Compton Street, Clerkenwell, in the co. of Middlesex, engineers, for "*Improvements in the packing of pistons, glands, pipe and other joints.*" Jan. 6, 1870.

67.—WILLIAM HENRY HUGHAN, of Newton Stewart, N.B., postmaster and guano and seed merchant, for "*Improvements in the treatment of nightsoil, sewage, urinous superphosphates, gas, lime refuse, and other refuse matters, for the purpose of deodorizing, of obtaining manure, and of diluting acids with urinous mixtures.*" Jan. 8, 1870.

68.—HENRY WILLIAM LOWDEN, of Douglas, Isle of Man, for "*An improved self-gauging and registering indicator for ascertaining the hourly, daily, or periodical consumption of liquids of any kind.*" Jan. 8, 1870.

78.—JOHN EDWARD LIPSCOMBE, of 8, Alexander Street, Salford, in the co. of Lancaster, filter manufacturer, for "*Improvements in filters or other apparatus for the purification of water or other liquids under high pressure.*" Jan. 11, 1870.

80.—EDME AUGUSTIN CHAMEROY, of 23, Boulevard de Strasbourg, Paris, for "*Improvements in means and apparatus for gauging or regulating the flow of water or other liquids.*" Jan. 11, 1870.

86.—ROBERT DOYNE DWYER, of 85, Gracechurch Street, in the City of London, civil engineer, for "*An improved self-closing tap for drawing off liquids.*" Jan. 11, 1870.

113.—GEORGE THORNELOE, of 34, London Wall, in the City of London, gas engineer, for "*A flexible valve for regulating the flow of fluids in pipes, and also in apparatus used in the manufacture of gas.*" Jan. 13, 1870.

GRANTS OF PROVISIONAL PROTECTION.

3681.—ALEXANDER ANGUS CROLL, of Coleman Street, in the City of London, civil engineer, for "*Improvements in the treatment of ammoniacal liquor of gas-works to obtain therefrom salts of ammonia.*" Dec. 11, 1869.

3682.—GEORGE THOMAS LIVESEY, of the South Metropolitan Gas-Works, Old Kent Road, in the co. of Surrey, for "*Improvements in apparatus used in the manufacture of gas.*" Dec. 20, 1869.

3742.—HENRY JOHN GIRDLESTONE, civil engineer, and JOHN WARD GIRDLESTONE, civil engineer, both of 37, Norfolk Street, Strand, in the co. of Middlesex, for "*Improvements in 'dry' closets, commodes, and urinals.*" Dec. 24, 1869.

3756.—ALFRED UPWARD, of the Chartered Gas Company, 146, Goswell Road, civil engineer, JAMES BANNEHR, of Great Queen Street, sanitary engineer, and the Rev. THOMAS PELHAM DALE, of 6, Ladbroke Gardens, Notting Hill, all in the co. of Middlesex, for "*Improvements in the manufacture and purification of gas, and in the utilization of waste and bye products of gas-works.*" Dec. 28, 1869.

3771.—JOHN RICHARDSON WIGHAM, of Albany House, Monkstown, in the co. of Dublin, Ireland, gas and lighthouse engineer, for "*Improvements in gas-burners for illuminating beacons, buoys, and lighthouses.*" Dec. 30, 1869.

3782.—THOMAS FRANCIS FRANCE, of Wigan, in the co. of Lancaster, plumber, for "*Improvements in the construction of baths and water-closets.*" Dec. 31, 1870.

15.—THOMAS CHARLES OLNEY, of Manchester, in the co. of Lancaster, for "*An Improved gas-stove, part of which is also applicable to blow-pipes and forges.*" Jan. 3, 1870.

20.—FREDERICK FOSTER, of Lansdowne Cottages, Essex Road, Islington, in the co. of Middlesex, for "*Improvements in instruments for measuring fluid or other pressure or weight.*" Jan. 3, 1870.

35.—ISHAM BAGGS, of High Holborn, in the co. of Middlesex, practical chemist, for "*Improvements in purifying coal gas.*" Jan. 5, 1870.

38.—EDMUND EDWARDS, of 22, Buckingham Street, Adelphi, in the co. of Middlesex, for "*Improvements in cocks and valves.*" Jan. 5, 1870.

NOTICES TO PROCEED.

2561.—JOHN LOADER, of Upper Clifton Street, Worship Square, in the co. of Middlesex, for "*Improvements in rotary engines and pumps.*" Aug. 28, 1869.

2580.—THOMAS WILSON, of Birmingham, in the co. of Warwick, gun manufacturer, for "*Improvements in screw and ratchet wrenches, part of which improvements is also applicable to pipe-cutters.*" Sept. 1, 1869.

2623.—FRIEDRICH WICKE, of Bockenheim, Prussia, sugar manufacturer, JULIUS BRÖNNER, manufacturer, THEODOR PETERSEN, chemist, and JOHANN GEORGE ZEHFUSS, professor, all of Frankfort-on-the-Maine, in the kingdom of Prussia, for "*Certain improvements in the treatment of human excrements, whereby they are converted into an inodorous, dry, and easily portable manure.*" Sept. 6, 1869.

2805.—ROBERT HARLOW, of Heaton Norris, in the co. of Lancaster, brass-founder, for "*Improvements in valves or cocks.*" Sept. 27, 1869.

3618.—WILLIAM COLLETT HOMERSHAM, of 2, Willes Road, Kentish Town, in the co. of Middlesex, civil engineer, for "*Improvements in pipes and conduits, and in the joints thereof.*" Dec. 15, 1869.

3736.—WILLIAM ROBERT LAKE, of Southampton Buildings, London, consulting engineer, for "*Improvements in the manufacture of metal tubing.*" A communication. Dec. 24, 1869.

3742.—HENRY JOHN GIRDLESTONE, civil engineer, and JOHN WARD GIRDLESTONE, civil engineer, both of 37, Norfolk Street, Strand, in the co. of Middlesex, for "*Improvements in 'dry' closets, commodes, and urinals.*" Dec. 24, 1869.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £50 BEFORE THE EXPIRATION OF THE THIRD YEAR.

3336.—MICHAEL HENRY, "*Improvements in centrifugal pumps, and in the joints or junctions of pipes and tubes.*" Dec. 19, 1866.

3424.—CHARLES HARRISON, "*Improvements in cocks or valves.*" Dec. 29, 1866.

Advertisements.

WANTED, a good Working Engineer, capable of taking charge of Gas-Works near London. Make about 15,000,000 cubic feet per annum. Age between 25 and 40. Must have had good experience in similar works. His duties would be confined entirely to the works.

Applications, with testimonials, stating wages, &c., to be sent to Mr. H. T. BALFOUR, 6, New Broad Street, LONDON, on or before the 27th of January.

WANTED, a Stoker. Good character indispensable. Wages 21s. per week. Overtime, when required, paid.

Apply to the MANAGER, Gas-Works, SLEAFORD.

WANTED, a situation as Manager or FOREMAN of a Gas-Work. Thoroughly understands the manufacture and distribution of gas, main and service laying, meter fixing, indices, and repairing meters (wet or dry), steam-engine, and exhauster. Age 32. First-class reference as to character and ability.

Apply to N. M., care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, A MANAGER OF GAS & WATER WORKS.

THE Brighouse Local Board require a Gas and Water Works MANAGER, thoroughly competent to undertake the sole management of their works, to keep all books and accounts of the Local Board, including the Gas, Water, and Highways Accounts. Security required £200.

Further information may be had of Mr. J. HEPWORTH, the present Manager.

Applications, stating salary required, to be accompanied by recent testimonials, to be sent sealed, on or before the 28th inst., to the LOCAL BOARD, Gas-Works, Brighouse, Yorkshire.

Brighouse, Jan. 14, 1870.

WANTED, to complete a Set, No. 23 of the JOURNAL OF GAS LIGHTING. Any subscriber willing to part with this number may obtain Three times the marked price for it by applying to Mr. KING, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by a Gas Engineer, a situation as ASSISTANT MANAGER in a Gas-Work. Is experienced in the manufacture and distribution of gas, analyses of coal and gas, and keeping of accounts; is also a good draughtsman.

Address A. G. N., care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TO GAS COMPANIES, &c.

AN experienced Gas-Fitter is in want of a SITUATION. Can repair wet and dry meters. First-class testimonials from firms and Gas Companies over a period of 12 years.

Address GAS-FITTER, 158, Upper Kennington Lane, LONDON, S.E.

MANAGER WANTED.

A Thoroughly competent Man, to take charge of a small Work where two stokers are employed. Wages to begin 30s. per week, with house-rent free.

Apply to Rev. DAVID EDWARDS, Gold Tops, Newport, MONMOUTHSHIRE.

TO GAS COMPANIES & ENGINEERS.

THE Advertiser, an experienced Engi-neer, who is also thoroughly and practically acquainted with the manufacture and distribution of gas, is desirous of MANAGING a Provincial or Foreign Gas-Work. Unexceptionable references and testimonials.

Address FUMES AND LIGHT, 163, Hill Street, WALWORTH.

TO GAS ENGINEERS.

THE Oriental Gas Company, Limited, require the services of an additional ASSISTANT MANAGER at Calcutta. Applicants must be of good address, and have had thorough experience in all branches of gas operations. Engagement five years. Passage paid out and home. Commencing salary £500 per annum. Age not to exceed 35 years.

Applications, with full particulars, to be addressed to ALFRED HERSEE, Esq., Secretary, 39, Old Broad Street, LONDON.

THE IMPERIAL CONTINENTAL GAS ASSOCIATION.

NOTICE is hereby given that an EXTRAORDINARY MEETING of the Proprietors of the Imperial Continental Gas Association will be held at the City Terminus Hotel, Cannon Street, in the City of London, on TUESDAY, the 1st day of February, 1870, at Two o'clock in the afternoon, for the purpose of considering the provisions of the Bill now before Parliament, intituled "A Bill for Granting Further Powers to the Imperial Continental Gas Association."

At such Meeting the said Bill will be submitted for the consideration and approval of the Proprietors.

ALBERT F. JACKSON, Secretary of the Association.

Dated this 6th day of January, 1870.

ROSSENDALE UNION GAS COMPANY.

A Thoroughly experienced and steady MANAGER and SECRETARY is wanted by the above Company. He must be fully qualified to conduct the manufacturing and engineering departments, and to take the entire control of the works in all its branches; he will also be required to keep the principal books, and to have the general oversight of the accounts. Security to the amount of £500 to be provided.

Applications, enclosing testimonials and stating salary expected, to be addressed to the Chairman of the Company, on or before the 27th inst.

Any further particulars will be furnished by the undersigned.

THOS. NEWBIGGING, Manager and Secretary.

Chief Offices, Bacup, Jan. 10, 1870.

STOCKTON CORPORATION GAS-WORKS.

THE Gas Committee are prepared to receive TENDERS for a new GASHOLDER, to contain 116,000 cubic feet, including erection.

Drawings and specification may be seen, and further particulars obtained, at the Manager's Office, Stockton-on-Tees Gas-Works.

Sealed tenders, endorsed outside, to be delivered to H. G. Faber, Esq., Town-Clerk, on or before the 16th of February, 1870.

The Committee do not bind themselves to accept the lowest or any tender.—By order of the Committee,

WM. FORD, Manager.

Stockton-on-Tees, Jan. 10, 1870.

ORLANDO BROTHERS'
SELF-ACTING DISTRICT GOVERNOR.

Prices, according to size, can be obtained upon application to

Mr. WILLIAM ARCHER,

METER COMPANY'S WORKS, OLDHAM.

TO CORPORATIONS, GAS ENGINEERS, AND OTHERS.

HENRY ALDER,

GRANGE METER-WORKS, EDINBURGH,

Begs to intimate that he is the ORIGINAL MANUFACTURER of

DRY GAS-METERS IN CAST-IRON CASES.

The Meters are protected by Registration on the 17th of December, 1864, under the "Copyright of Designs Act."

They are much more durable, and at the same time more easily repaired than those in Tin Cases.

PRICE LIST AND TERMS ON APPLICATION.

Agent for Ireland—Mr. J. FURNESS, 3, Fownes Street, DUBLIN.

Price Current.

CASTINGS.—*Per Ton.*

Average Weight of Cast-iron Gas-pipes, per Yard.

1 in.	2 in.	2½ in.	3 in.	4 in.	5 in.	6 in.	7 in.	8 in.	9 in.	10 in.	12 in.
18	21	28	33	51	70	89	107	126	149	177	208 lb.

Retail Prices are 5 to 10 per cent. higher.	London.			Glasgow.			Newcastle and Middlesboro'.			Wales.			Yorkshire, Derbyshire, and Staffordshire.		
	£.	s.	d.	£.	s.	d.	£.	s.	d.	£.	s.	d.	£.	s.	d.
Pig Iron, No. 1 (g.m.b.)	3	17	6	2	18	0	2	13	0	3	10	0	3	15	0
1¼ and 2-inch Socket-pipes	7	0	0	5	15	0	5	10	0	6	0	0	7	0	0
2½ and 3-inch ditto	6	10	0	5	5	0	5	0	0	5	13	0	6	10	0
4 and 5-inch ditto	6	0	0	4	15	0	4	10	0	5	5	0	6	0	0
6 inches and upwards ditto	5	15	0	4	5	0	4	0	0	5	0	0	5	15	0
Retorts, 1st fusion, hot blast	5	10	0	4	10	0	4	5	0	5	0	0	5	10	0
Ditto, 2nd ditto, cold ditto	6	10	0	—			—			—			6	10	0
Tank-plates, ¼ thick and above	6	0	0	5	0	0	4	15	0	5	10	0	6	0	0

WROUGHT-IRON TUBING,

Subject to 60 per cent. Discount.

	2 in.		1½ in.		1¼ in.		1 in.		¾ in.		½ in.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Patent Welded Tubes, from 2 to 14 feet—per foot	1	6	1	1	0	10	0	7	0	5	0	4½
Ditto ditto, from 12 in. to 23½ in.—each	5	0	2	0	1	6	1	1	0	9	0	8
Long Screws, from 12 in. upwards	4	0	2	3	2	0	1	6	1	2	0	11
Bends and Springs	4	3	2	3	1	9	1	3	0	11	0	8
Square Elbows, equal or reducing; Round Elbows, 5 per cent. extra	3	9	2	3	1	9	1	3	0	10	0	8
Tees, wrought or cast	4	0	2	6	2	0	1	6	1	1	0	9
Crosses, ditto, equal or reducing	4	9	3	6	3	0	2	3	1	0	1	6
Iron Cocks	20	9	13	0	10	0	7	3	5	0	3	8
Ditto, with brass plug	28	0	16	0	13	0	7	0	5	6	4	6
Diminishing Sockets, Caps, Plugs, and Nipples	1	3	0	9	0	8	0	6	0	5	0	4½
Plain Sockets	1	9	0	8	0	7	0	5	0	4	0	3
Syphons, 2-quart	15	0	14	0	13	6	13	0	12	0	—	

GAS COALS.

Newcastle—Unscreened:—	Per Ton.
	6s. 6d.
Hawells, Nettlesworth Primrose, and South Pelaw	
Felling, Framwell Gate, North Pelton, Redheugh Main, Walker's Primrose, West Wear, and Whitwell Primrose	6 9
Burnhope, Craghead, Charlaw, Derwent, East Castle, Edmondsley, Eighton Moor, Hartlepool Pelaw, Holmside, Lambton's Gas, Lanchester Pelaw, Medomsley, Mickley, New Pelaw, Pelaw Main, Ravensworth, Seaham, South Moor Pelton, South Leverson, Townley Main, Tyne Main, West Pelaw, Wearmouth Hutton, and Witton	7 0
Peareth, Ravensworth Pelaw, Waldridge, West Garesfield, and West Pelton	7 3
Brancepeth, Dean's Primrose, Londonderry Gas, New Pelton, Pelton, South Peareth, Stella, Urpeth, Washington Hutton, and West Leverson	7 6
Ramsay's Newcastle Cannel	15 0
Wigan Cannel (at Liverpool)	17 0

Scotch Cannel:—	Per Ton.	*Scotch Cannel:—*	Per Ton.
Boghead—at Bo'ness, 47s. 6d.; at Leith	48s. 2d	Pirnie, or Methill	17s. 6d
Muirkirk	27 0	Lothian's Cannel (f.o.b. at Leith)	26 0
Kirkness, best (at Burntisland)	28 6	Bo'ness Cannel (at Bo'ness)	19 0
Capeldrae, 1st quality (at ditto)	28 6	Myles' Cannel	23 6
Ditto, 2nd ditto (at ditto)	18 6	Kinnaill (at Bo'ness)	17 6
Cowdenbeath	12 0	Lochore Parrot (at Burntisland)	26 0
Lesmahago (at Glasgow)	31 6	Lanemark (at Glasgow)	16 0
Ditto (at Granton)	32 6	Elphinstone Tower (at Leith)	29 0
Arniston	27 6	Coppa Cannel (on rails at Birkenhead)	13 6
Wemyss, f.o.b.	22 6	Ditto ditto (ditto at Connah's Quay)	13 0
Haywood, Wilsontown (at Granton)	25 0		

FREIGHTS.

Coastwise—Newcastle:—	Per Ton.	*Foreign:—*	Per Keel.
Chatham and Rochester	6s. 6d	Barcelona	£20 10s
Cork	10 0	Bordeaux	13 0
Dover, Folkestone, and Ramsgate	7 0	Boulogne and Calais	8 0
Dublin	10 6	Cadiz	12 10
Exeter Quay	10 6	Cronstadt	—
Ipswich	5 0	Copenhagen	—
London (from Leith)	8 6	Genoa	18 10
London (Pool)	6s. 3d. to 6 6	Hamburg	9 0
Lowestoft and Yarmouth	4 6	Havre de Grace	10 10
Portsmouth and Southampton	8 6	Leghorn	18 15
Plymouth	9 6	Lisbon	12 5
Shoreham	7 6	Rotterdam	10 10
Whitstable	6 0	Stettin	—
Weymouth	9 0	Trieste	16 0
		Venice	19 0

SUNDRIES.

Best Newcastle Fire-bricks, per 1000	£2 10s. to £2 15s. 0d.
Cliff's Fire-bricks (at Wortley), per 1000	2 15 6
Ingham's ditto (at Wortley), per 1000	2 15 0
Farnley Iron Co.'s Fire-bricks (at Wortley), less discount	2 17 0
Fire-clay Retorts, per foot run	5s. 6d. to 0 7 6
Tarred Rope Yarn, per cwt.	1 0 0

CHEMICAL, MINERAL, AND METAL MARKETS.

[*From* J. Berger Spence and Co.'s *Weekly Report.*]

In Minerals a fair amount of business has been done, and several contracts were entered into, at the quarterly meeting, for most descriptions of iron ore; in some cases, at a slight advance on quotations. There has been little doing in Metals during the past week. In Scotch pig a good business has been done, and prices are slightly firmer. Cleveland maintains its value. At the quarterly meeting, lately held at Birmingham, it was determined to adhere to the advance in the price of manufactured iron. Very few transactions were reported. In copper the market is a shade quieter, through the advice of large charters from the west coast, but no change has been made in quotations. Tin is very dull. Lead in fair demand. Spelter inactive, but no alteration in prices.

CHEMICALS.

SODA.—The market for Soda Ash, Caustic Soda, Crystals, and Salt Cake is unaltered, and prices remain as last week. In Bicarbonate some sales at £9.

NITRATE OF SODA has met with some demand at £15 5s. to £15 10s., and £14 15s. to arrive.

POTASH.—The supply of Muriate is still insufficient for the demand, and prices are stiffening at £7 12s. 6d. to £7 15s. F.O.B. for 80 per cent. early shipment.

SALTPETRE.—Foreign, 22s. 6d., and inactive; English Refined, 26s.

ALUM meets with a fair demand; prices stationary. Cake Compounds very quiet.

AMMONIA.—Sulphate of 24 per cent. at £16 15s. for immediate delivery to £17 for spring. Grey not much wanted; Brown in request at £15 10s. to £15 15s. Muriate quiet.

COPPERAS.—Green and Rusty more inquired for at 50s. to 52s.; Dry active at £2 10s.

PYRITES continues as before, the market being fairly supplied. Calcined, 44s. B.C.

LIME.—Phosphate unchanged, at 52s. 6d. for 65 per cent. Bleaching Powder in considerable demand at £8 for 35 per cent. Disinfectants command a ready sale at £5 5s. per ton.

MANGANESE sells at 80s. for 70 per cent.

IRON ORE.—Hematite maintains firm prices. Oolitic Ore in considerable demand at 6s. 9d. to 8s. 6d. Staffordshire.

METALS.

IRON.—Scotch Pig Iron, 56s. 6d. to 56s. 7½d. Cleveland firm at 49s. for Forge to 53s. 6d. for No. 1. Welsh Bars, £6 5s. to £6 7s. 6d. Staffordshire Bars, £7 10s. to £8 10s. Gas Tubes, 40 per cent. to 47½ per cent. off list. Boiler Tubes, 40 per cent. to 42½ per cent.

COPPER.—Unaltered. English Tough Ingot, £70 10s. to £72. Chili Slab, £66 10s. to £67.

TIN depressed. English Ingots, £112. Straits, £104 10s. to £105.

LEAD.—Steady. P. G. Best English Soft Pig Lead, £19.

SPELTER.—Quiet. English, £19 10s. to £20. Silesian, special brands, £19 5s. to £19 10s.

Share List of Metropolitan Gas Companies.

Number of Shares issued.	Amount per Share.	Name of Company.	Amount paid up p. Share.	Dividend p. Cent. p. Annum.	Latest Quotations.
	£		£ s. d.	£ s. d.	£
8000	10	Anglo-Romano	10 0 0	10 0 0	11 — 12
5000	20	Bahia (Limited)	20 0 0	3 0 0	11 — 11¼
1009	20	Do., preference	20 0 0	10 0 0	23 — 24
750	20	Do., do., redeemable	20 0 0	10 0 0	20 — 22
40000	5	Bombay (Limited)	5 0 0	4 10 0	4¼ — 5
10000	5	Do., third issue	4 0 0	4 10 0	3¾ — 4
10000	20	British (Limited) (Norwich, Hull-Sculcoates, Hanley, Tunstall & Shelton [Potteries], Trowbridge, & Holywell.)	20 0 0	10 0 0	30 — 31
12000	50	*Chartered*	50 0 0	6 0 0	59 — 60
6000	50	Do.	45 0 0	6 0 0	54 — 55
30000	10	Do., preference	1 0 0	5 0 0	1½ — 1¾
10000	20	*City of London*, A shares	20 0 0	9 0 0	25¾ — 26¼
10000	10	Do., B shares	10 0 0	4 0 0	6¾ — 7
9629	10	Do., new shares	10 0 0	9 0 0	12¾ — 13
17490	25	*Commercial*	25 0 0	10 0 0	36 — 38
20000	20	Continental Union	20 0 0	8 0 0	26¾ — 27
10000	10	Do., new	2 10 0	..	4¼ — 4¾
5213	20	Do., preference	20 0 0	7 0 0	23 — 24
5000	10	*Crystal Palace District*	10 0 0	10 0 0	14¼ — 15
5000	10	Do., preference	10 0 0	6 0 0	11 — 11½
10000	10	Do., new shares	10 0 0	7 0 0	11 — 11½
4000	50	*Equitable*	50 0 0	10 0 0	78 — 78½
4000	25	Do., new shares	25 0 0	10 0 0	39 — 39½
23406	10	European (Limited)	10 0 0	11 0 0	16 — 16½
12000	10	Do., new shares (Boulogne, Amiens, Rouen, Caen, Havre, & Nantes.)	5 0 0	11 0 0	8¾ — 9
20000	10	*Great Central Gas Consumers*	10 0 0	..	13 — 14
5000	10	Hong Kong (Limited)	10 0 0	6 0 0	9¾ — 10
26000	50	*Imperial*	50 0 0	10 0 0	79¾ — 80
26000	10	Do., new shares	4 0 0	10 0 0	8¾ — 9
26000	12½	Do., new shares	12 10 0	7 0 0	14 — 14¼
1300	100	Do., bonds	£100	10 0 0	175 —180
28000	50	*Imperial Continental* (Amsterdam, Berlin, Ghent, Hanover, Lille, Rotterdam, Aix-la-Chapelle, Antwerp, Bordeaux, Brussels, Cologne, Frankfort-on-Maine, Haarlem, Stolberg, Toulouse, & Vienna.)	43 15 0	18 5 0	133 —136
400	100	Imperial Mexican (Limited)	100 0 0	nil.	
200	100	Do., new	100 0 0	nil.	
3000	40	*Independent*	40 0 0	10 0 0	56 — 58
3000	10	Do.	10 0 0	5 0 0	7 — 8
3000	20	Do.	15 0 0	7 10 0	15 — 16
7133	50	*London*	50 0 0	10 0 0	77 — 78
5610	25	Do., 1st preference	25 0 0	6 0 0	26 — 27
503	50	Do., 2nd preference	50 0 0	6 0 0	
214	50	Do., 3rd preference	50 0 0	6 0 0	
£18781		Do., 1st preference stock		6 0 0	
£11828		Do., 2nd preference stock		5 0 0	
		Nictheroy, Brazil (Limited)			
15000	5	Malta and Mediterranean (Limited)	5 0 0	3 10 0	3¾ — 4
6000	5	Do., preference	5 0 0	7 0 0	4¾ — 5¼
30000	5	Oriental (Calcutta)	5 0 0	10 0 0	8 — 8¼
30000	5	Do., new shares	1 0 0	10 0 0	2¾ — 2¾
10000	5	Ottoman (Limited)	5 0 0	nil.	2 — 2¼
12500	10	Pará (Limited)	10 0 0	7 10 0	10 — 10½
27000	20	*Phœnix*	20 0 0	10 0 0	30 — 30½
3600	100	Do., new	40 0 0	7 10 0	42¾ — 43
144000	8k.	Do.	100 0 0	5 0 0	73¾ — 74¼
5000	20	*Ratcliff*	20 0 0	10 0 0	26 — 27
	20	Rio de Janeiro (Limited)	20 0 0	10 0 0	26 — 26¼
6959	5	Singapore (Limited)	5 0 0	5 0 0	
2000	5	Do., preference	5 0 0	7 10 0	
		Shanghai			
4000	50	*South Metropolitan*	50 0 0	10 0 0	80 — 82
4000	12½	Do.	12 10 0	10 0 0	20 — 20½
20000	12½	Do., new shares	1 0 0	10 0 0	3 — 3¼
15000	10	*Surrey Consumers*	10 0 0	10 0 0	14¼ — 15
10000	10	Do., new	6 0 0	10 0 0	9 — 9½
9000	4	United General (Limerick)	4 0 0	5 0 0	2 — 2½
10000	10	*Victoria Docks*	5 0 0	6 0 0	
1500	10	*Wandsworth and Putney*	10 0 0	10 0 0	10 — 12
1500	10	Do.	10 0 0	7 10 0	
1819	10	Do.	10 0 0	7 10 0	
1138	10	Do.	5 0 0	7 10 0	
20000	10	Western (Limited) A shares	10 0 0	10 0 0	16 — 16½
10000	10	Do., B shares	8 0 0	10 0 0	13 — 13½
10000	10	Do., C shares	8 0 0	10 0 0	13 — 13½
20000	10	Do., D shares	1 0 0	10 0 0	2¾ — 3
16000	5	*West Ham*	5 0 0	7 10 0	7 — 7¼
551	10	West London Junction (Limited)	10 0 0	6 0 0	
520	10	Do., preference	10 0 0	6 0 0	

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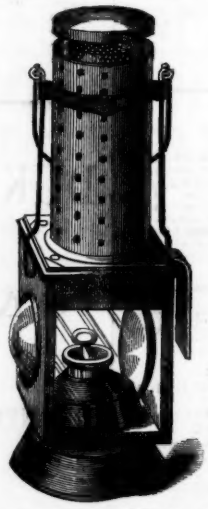

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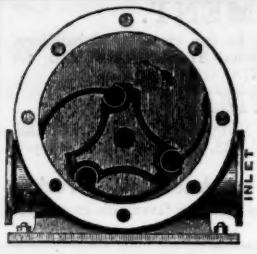

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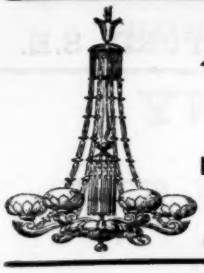

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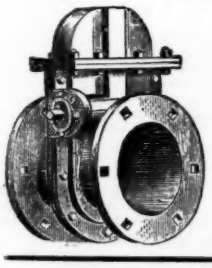

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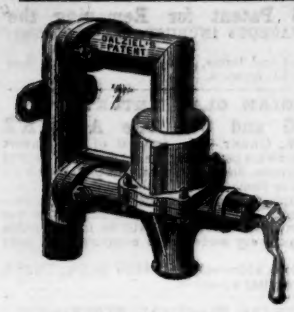

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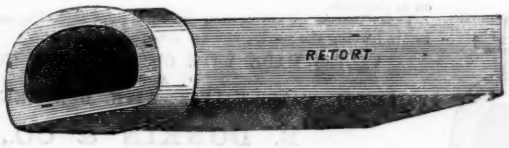

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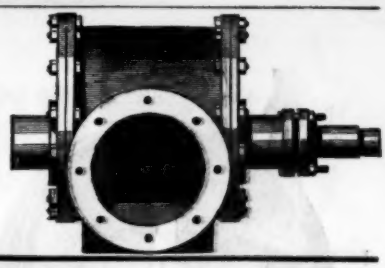

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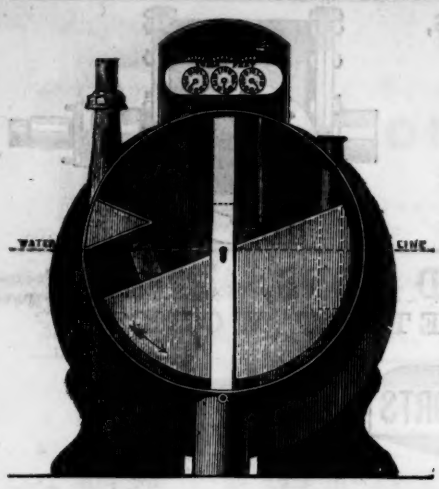

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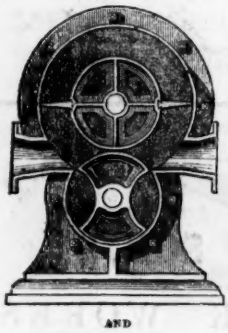

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